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Investigation of Background Radiation and Associated Anomalies in Rifle, Colorado

D. R. Smuin
M. J. Wilson
J. W. Crutcher

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Health and Safety Research Division

INVESTIGATION OF BACKGROUND RADIATION AND
ASSOCIATED ANOMALIES IN RIFLE, COLORADO

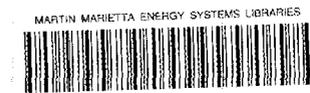
D. R. Smuin
M. J. Wilson
J. W. Crutcher

Grand Junction Project
Grand Junction, Colorado

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C. A. Little – RASA UMTRA Manager

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ABSTRACT

Oak Ridge National Laboratory (ORNL) was contracted to assist the Department of Energy as the Inclusion Survey Contractor (ISC) for the Uranium Mill Tailings Remedial Action (UMTRA) Project. An investigation of background radiation and associated anomalies around Rifle, Colorado, was conducted in association with the UMTRA project.

In performing these radiological surveys, ORNL personnel encountered several anomalies when determining the background gamma exposure rate range vs elevated gamma exposure rates due to the presence of uranium mill tailings.

Procedures used include direct radiation measurements and soil sampling as addressed and outlined in ORNL/TM-9902, *Radiological Survey Activities—Uranium Mill Tailings Remedial Action Project Procedures Manual*.

In addition to examining anomalies and establishing the background gamma exposure rate range, the study presents a formula to convert thousand counts per minute (kcpm) from a gamma scintillator to microrentgen per hour ($\mu\text{R}/\text{h}$) for the Rifle region. Also, a method is presented to identify contaminated areas containing excess ^{226}Ra , by using a GR-410 gamma spectrometer. This method is suggested to be applied to all property surveys in the Rifle area.

The Wasatch Formation, which outcrops extensively in the Rifle area, was found to have a major influence on the background radiation. Varying potassium concentrations and naturally occurring uranium in this rock unit reveal varying gamma exposure rates. Examining Ra/Th ratios from laboratory analysis of soil samples or use of Ra/Th ratios from GR-410 gamma spectrometer readings on site allows discrimination between mill-related contamination and naturally occurring radioactivity.

Radioactive coal clinkers were found used as fill material throughout the Rifle region and have been determined to be a product of the mill and subject to remediation.

Finally, windblown mill tailings contamination is addressed in some detail. Mill tailings redistributed from the Rifle uranium mill tailings piles by prevailing winds were detected extensively on vicinity properties in Rifle. Some radioactive components of the windblown tailings were found to have leached into the subsurface soil. The combination of Wasatch Formation, radioactive coal clinkers, and windblown tailings accounts for many of the anomalous gamma exposure rates observed by the radiological survey teams.

INTRODUCTION

PURPOSE

In 1978, in recognition of the potential health hazards from low-level radiation, Congress passed legislation (PL95-604, the Uranium Mill Tailings Radiation Control Act) that authorized the Department of Energy (DOE) to carry out an extensive nationwide cleanup program. Oak Ridge National Laboratory (ORNL) was contracted to assist the DOE as the Inclusion Survey Contractor (ISC) for all vicinity properties, including the Rifle, Colorado, area. However, only radioactive materials exceeding the levels set forth by the Environmental Protection Agency (EPA) in 40 CFR/192 and originating from the milling process are eligible for cleanup under the Uranium Mill Tailings Remedial Action (UMTRA) Project. Therefore, it is important for the ISC to be able to make the distinction between background radiation and contamination.

During the search for uranium mill tailings on Rifle vicinity properties, anomalies were encountered in establishing the background gamma exposure rate range. Subsequently, this study was undertaken to examine the background gamma exposure rates and to explain the anomalies.

Three possible explanations for the anomalous gamma exposure rates were proposed and investigated. The first possible explanation was that the regional geology was influencing the background gamma exposure rate. The second possibility was that radioactive coal fly-ash from home furnace emissions might have been spread by wind throughout the area. The last explanation was that widespread windblown mill tailings had leached into the soil over a large portion of the Rifle area, causing slightly elevated ^{226}Ra concentrations in the subsurface. This study, therefore, investigated each idea in detail and determined the source of background gamma anomalies. The report also presents a regional Rifle background gamma exposure rate range.

SIGNIFICANCE OF FINDINGS

Several interrelated findings resulted from the study of background gamma radiation in Rifle. First, a formula was derived for converting scintillometer thousand counts per minute (kcpm) to microroentgen per hour ($\mu\text{R}/\text{h}$) for the Rifle area. Second, a procedure was instituted for using the portable gamma spectrometer to identify areas of windblown contamination, which are ubiquitous in Rifle. Also, an explanation was found for the unusual mixture of background gamma exposure rates encountered due to the varying potassium concentrations and naturally occurring radium anomalies found in the soil and rock units. During the study the portable gamma spectrometer was found to be an excellent tool for separating background from contaminated regions by simply calculating the in-situ Ra/Th ratio. In all cases where the Ra/Th ratio was less than 2, the ^{226}Ra -in-soil concentration was near the background average for Rifle.

HISTORY OF THE RIFLE SITE

There are two inactive uranium-mill sites located in the Rifle area (Fig. 1), which are referred to as "Old Rifle" and "New Rifle" (Figs. 2 and 3). These sites are owned by Union Carbide Corporation. Uranium mill tailings piles exist at both of these sites and have been described in detail by Ford, Bacon, and Davis (1977) and Haywood et al. (1980). Low-level radioactivity is present in these tailings, which were available for very limited public use before the potential health hazards of radiation were realized. Furthermore, prevailing winds have scattered tailings over a large area downwind of the two piles (Fig. 1). Other radioactive materials once associated with the mills, but now scattered around the community, include salvaged building supplies and radioactive coal clinkers from the mill's calcining furnace. The radioactive elements of the uranium and potassium decay chains occurring naturally in the geologic strata of the Wasatch Formation also contribute to the low-level radioactivity.

GEOGRAPHIC LOCATION

The area of concern for this study is confined to 5.2×10^7 m² (20 square miles), including the city of Rifle, specifically R92W, T5S Section 31, R93W, T5S Sections 33-36, R93W, T6S Sections 3-10 and 15-18, and R94W, T6S Sections 1, 12, and 13, in Garfield County (Fig. 1). The Colorado River flows west through the southern edge of the study area; the river is bordered by Interstate 70 on the south and the Denver and Rio Grande Western Railroad tracks on the north. The city of Rifle (population ~4500) is in the southeast quadrant of the study area. The Rifle tailings piles and millsites are located on the river alluvium of the Colorado River floodplain. Other river alluvium occurs on terraces on the east and west side of town that are relics of the ancient Colorado River floodplain.

METEOROLOGY

Prevailing winds in the area are from the west along the river valley (Ford, Bacon, and Davis 1977). Windblown contaminants from the inactive tailings piles contribute to the anomalous gamma exposure rates found in the area. Winds with velocities of over 15 mph, while infrequent, almost always blow from the northwest or southwest. These higher velocity winds were probably responsible for scattering tailings from the piles since winds at lower velocities are not capable of redistributing the sand-sized material contained in the tailings piles (Ritter 1978). Consequently, most of the windblown tailings material is located generally to the east, as shown in Fig. 1.

The annual precipitation in the Rifle area is about 27.9 cm (11 in.), and the mean temperature is 8.8°C (47.9°F) (Ford, Bacon, and Davis 1977).

GEOLOGIC SETTING

The study area lies in the west central portion of the Leadville 1° × 2° Quadrangle, which is within the Colorado Plateau Physiographic Province. To the north and northeast rises the Grand Hogback, a monocline which is the boundary between the White River Uplift on the east and the Piceance Creek Basin on the west. The Grand Hogback is

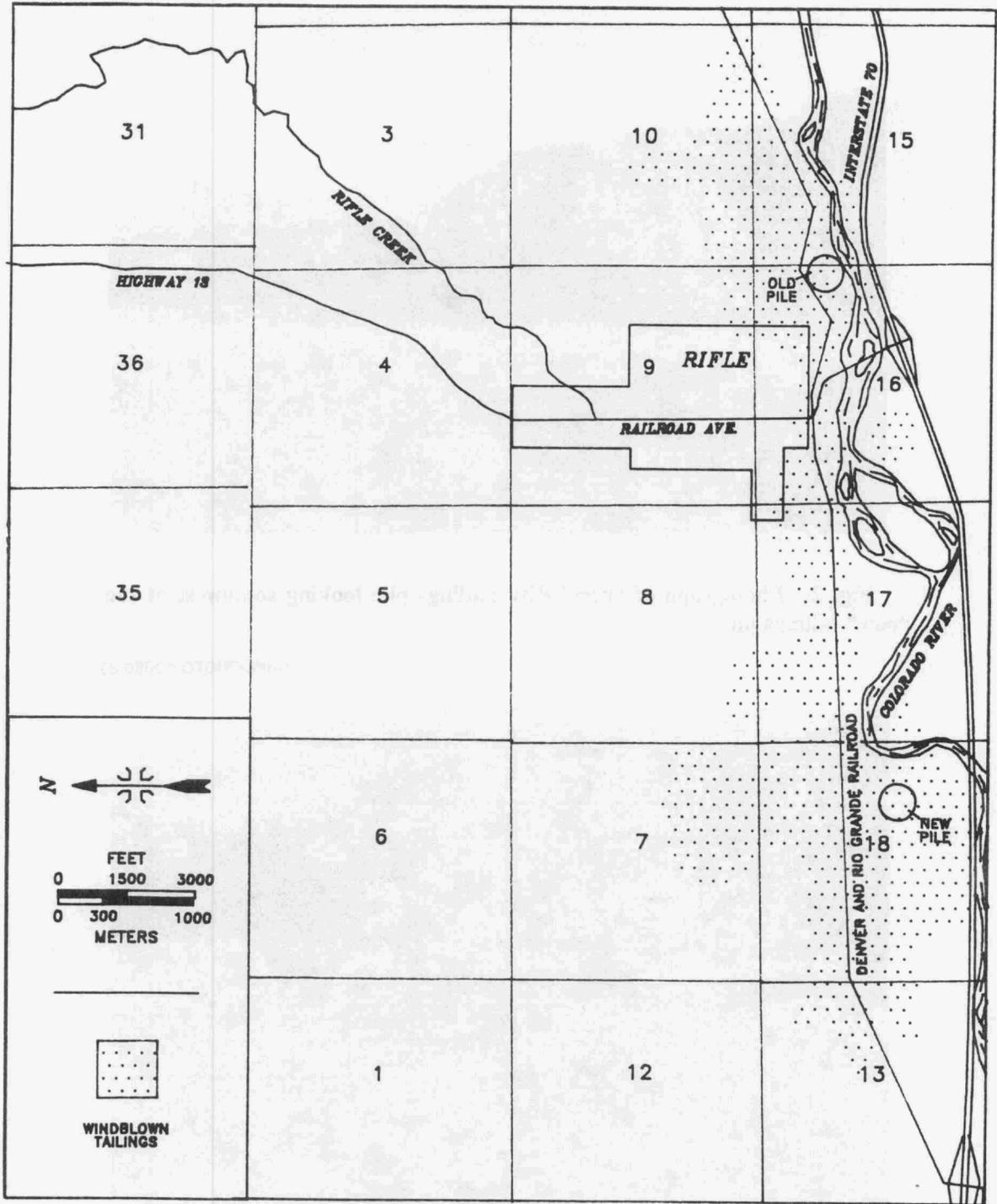


Fig. 1. Windblown tailings map of Rifle study area.

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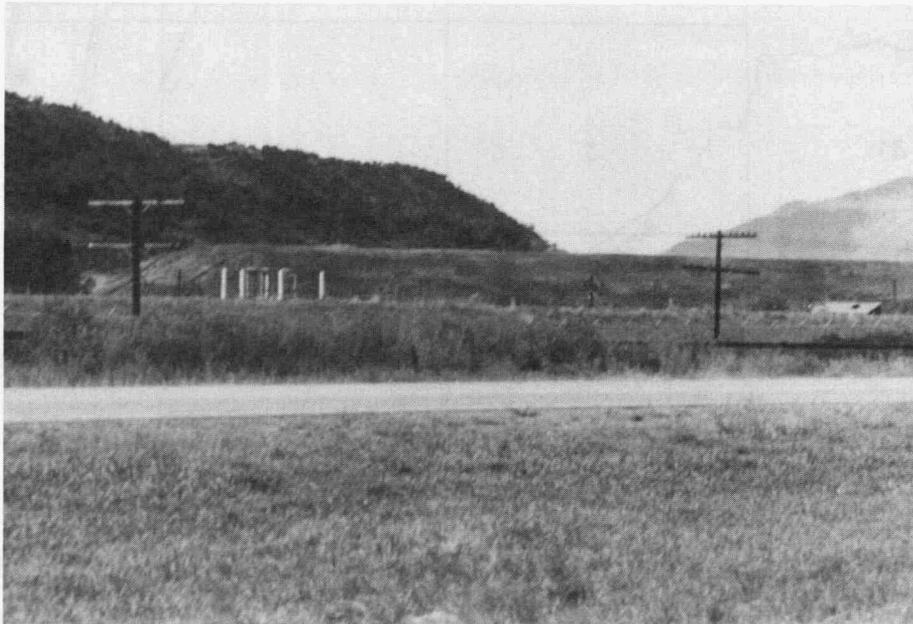


Fig. 2. Photograph of "new" Rifle tailings pile looking southwest at the "new" tailings pile.

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Fig. 3. Photograph of "old" Rifle tailings pile looking southwest at the "old" tailings pile.

formed from the resistant sandstone members of the Mesa Verde Group. The Roan Cliffs capped by the Green River Formation loom to the northwest (Fig. 4). Battlement Mesa (a basalt-capped equivalent of the Roan Cliffs) lies southwest of the study area and is stratigraphically younger than the Grand Hogback. The Colorado River flows westward through the study area, and the relics of the ancient Colorado River floodplain form terraces on top of the Wasatch Formation. The terraces surround the city of Rifle on the east and west sides. The Rifle tailings piles and inactive millsites are located below the terraces on the present-day alluvium of the Colorado River floodplain.

SURFACE GEOLOGIC UNITS

Because the surface geology influences the background radiation, a brief discussion is presented here. A more in-depth treatment is provided by the appropriate references. The surface geology in the study area comprises three units: the late Paleocene/Eocene Wasatch Formation, Quaternary Terrace Gravels, and Quaternary Alluvium (Fig. 5).

Quaternary Alluvium

Quaternary Alluvium consists of mud, silt, sand, gravel, and cobbles deposited by the westward flowing Colorado River and its tributaries. The erosion resistant gravel clasts of the Colorado River floodplain were primarily derived from the older Mesozoic and Paleozoic Formations of the Glenwood Canyon area. The Colorado River floodplain is a 100-year-old floodplain in the Rifle area (Ford, Bacon, and Davis 1977). Some of the pediments found in this low-lying valley are colluvium resulting from the sluffing-off of older river terraces and perhaps the Wasatch Formation, which forms the bedrock of the valley. The town of Rifle lies in the valley formed by the Rifle Creek floodplain. The fine-grained floodplain alluvium was derived mostly from the Wasatch Formation, which is easily eroded and outcrops extensively along the Rifle Creek drainage.

Quaternary Terrace Gravels

The Quaternary Terrace Gravels are deposits of the ancient Colorado River floodplain resting on the sediments sloping down from the Grand Hogback. Imbricated terrace gravels and cobbles are seen in roadcuts in the bluffs which flank the east and west sides of the city of Rifle (Fig. 6). The sediments consist of coarse clasts washed down from the Glenwood Canyon Mesozoic and Paleozoic rock outcrops. A large portion of these sediments are also fine clays derived from the Wasatch Formation and other shaley units that outcrop upstream. It should be noted that in the Rifle area the most prevalent source of clays is the Wasatch Formation.

Tertiary Wasatch Formation

The Wasatch Formation, which approaches 1524 m (5000 ft) in thickness, is composed of dominantly clay-bearing rocks. It is late Paleocene/Eocene and consists of variegated red, brown, buff, and rust-colored mudstones, siltstones, and sandstones (Fig. 7). There are some conglomerate beds, carbonaceous shales, and lignites near the base. The rocks of the Wasatch Formation are considered transitional from stream and floodplain deposits to delta and lake deposits.

The Wasatch Formation proved to be the major influence in the background radiation levels in the Rifle area, as will be discussed in the Results section of this report.

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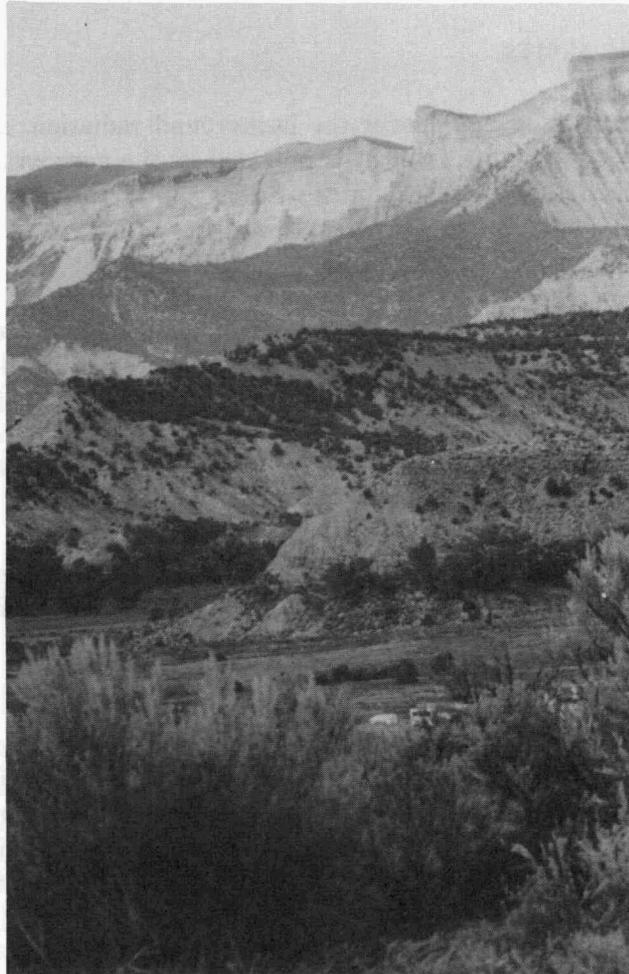


Fig. 4. Photograph of Roan Cliffs looking northwest at the Roan Cliffs formed by the Green River Formation and the lower ridges of the Wasatch Formation.

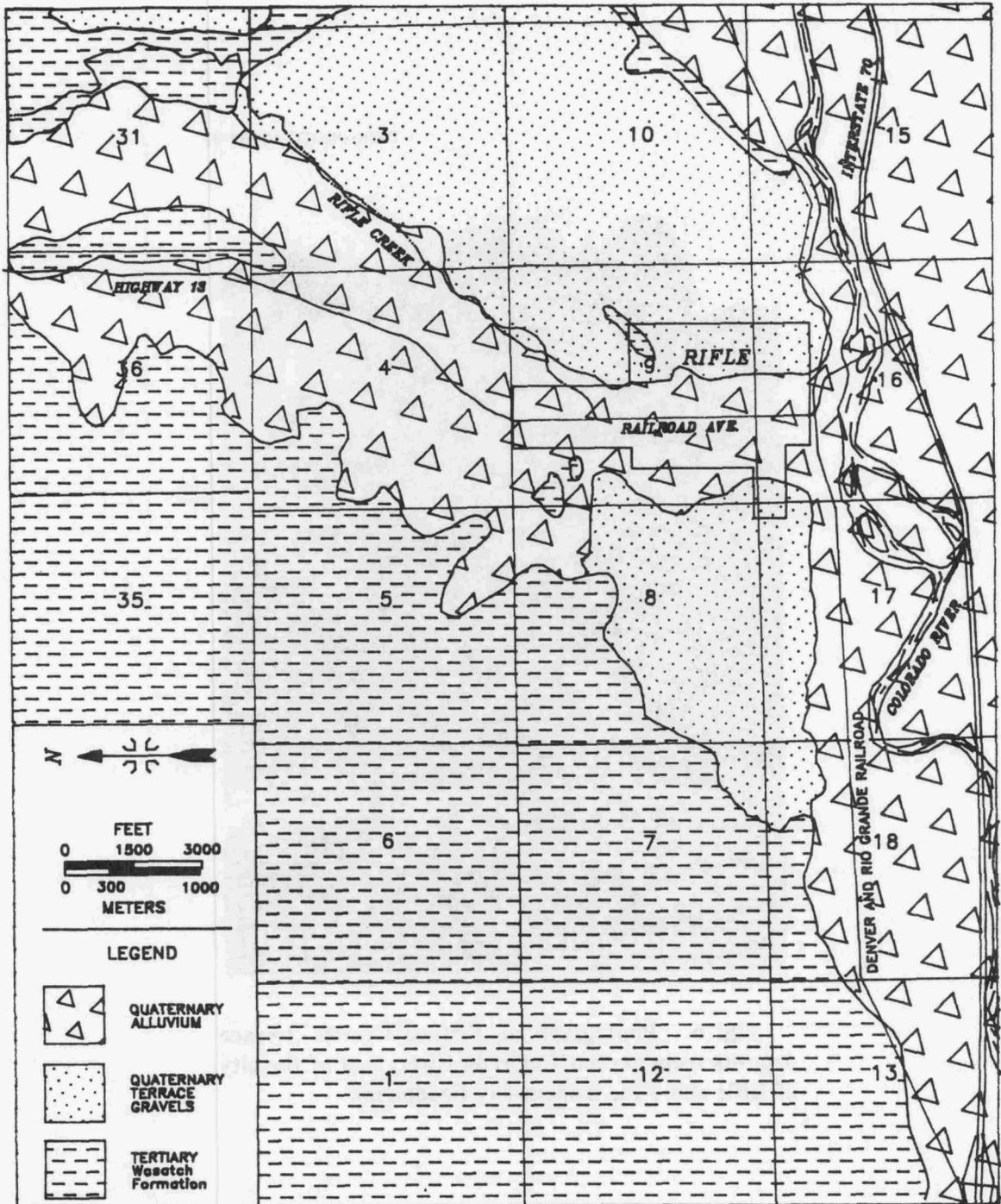


Fig. 5. Surface geology map of Rifle study area.

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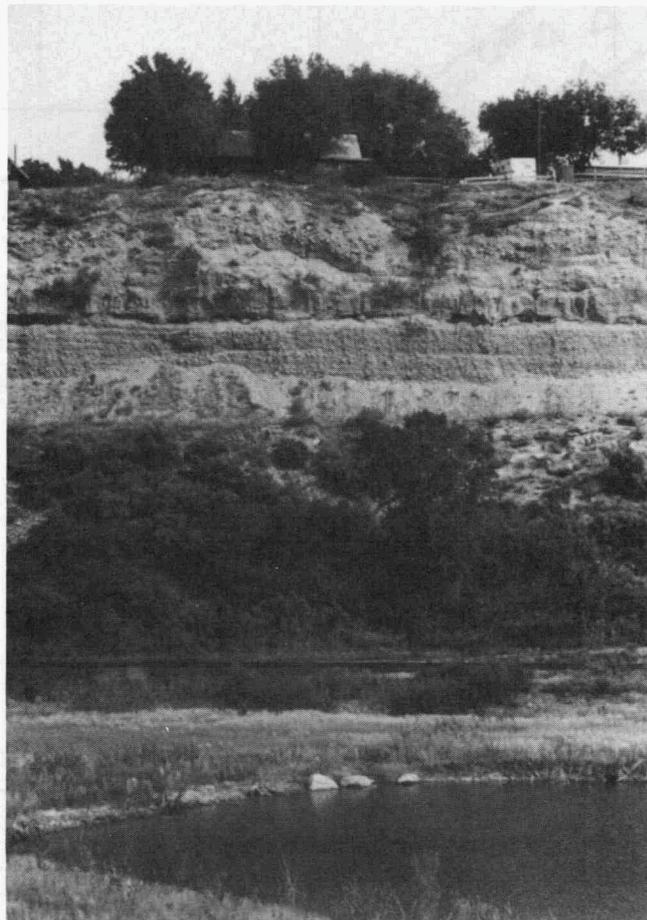


Fig. 6. Photograph of Terrace Gravels (terrace deposits from ancient Colorado River, east of the city of Rifle above the modern-day floodplain).

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Fig. 7. Photograph of Wasatch Formation. The Green River Formation forms the cliffs on the skyline, and the variegated claystones and interbedded sandstones of the Wasatch Formation are shown rising above Rifle Creek.

DATA COLLECTION

LITERATURE SEARCH

Prior to the field investigation of the background radiation in the Rifle area, a literature search was conducted. The objectives of this search were (1) to determine that a similar study had not already been done and (2) to develop a picture of the regional geologic history and its relationship to the regional background radiation.

Several references (listed in the Reference section of this report) related to the regional geology and the naturally occurring radioactive elements in the rocks (Collins et al. 1982; Galloway et al. 1978; Ford, Bacon, and Davis 1977; Tweto et al. 1976; Malan and Sterling 1969). Two reports dealt with the mill tailings at the Rifle sites. However, none of these reports defined the regional background radiation or related it to the regional geology. The field investigation was initiated to define this relationship between geology and radiation.

FIELD INVESTIGATION

The initial step in the collection of field data was to determine a preliminary background range for the study area. Some previous gamma scanning experience in the study area was augmented by taking several widespread gamma readings around rock outcrops and in areas of known contamination. A preliminary background gamma rate range of 4 to 6 kcpm was established. This range was later modified by the results of the field data evaluation. The type of measurements taken included direct on-site sampling and gamma radiation readings and later the laboratory analysis of soil samples for ^{226}Ra , ^{232}Th , and ^{40}K (Little et al. 1986). Direct measurements and sampling (detailed in Appendix B) were performed at 76 locations in the study area. The raw data from sampling and direct measurements are part of Appendix C, and the sample locations are on the location map (Fig. 8). The locations examined were either Wasatch Formation outcrops or areas of alluvium, some of which have windblown contamination or coal clinker fill. For 20 of the locations only pressurized ionization chamber (PIC) and scintillometer readings were taken. Several of the locations examined were vicinity properties surveyed by ORNL during the UMTRA Project. Soil sample locations were chosen on the basis of several factors. The first priority was to get widespread coverage of the study area. Coverage was designed to include random Wasatch rock outcrops and alluvium-covered areas with representative background radiation. The second priority was to include vicinity properties with both background radiation and elevated radiation from windblown contamination.

PROCEDURE

A surface gamma exposure rate measurement was recorded from a scintillation probe at each representative sample location. A surface gamma exposure rate was also taken for comparison using a Reuter-Stokes PIC, and a reading was taken with the GR-410 gamma spectrometer (see Appendix A, Sampling and Analytical Equipment). A subsurface scintillometer gamma reading was taken, 15 cm deep, after digging a posthole to obtain the soil sample (see Appendix B, Measurement and Analytical Procedures). Usually the subsurface gamma measurement was expected to exceed the surface reading due to the

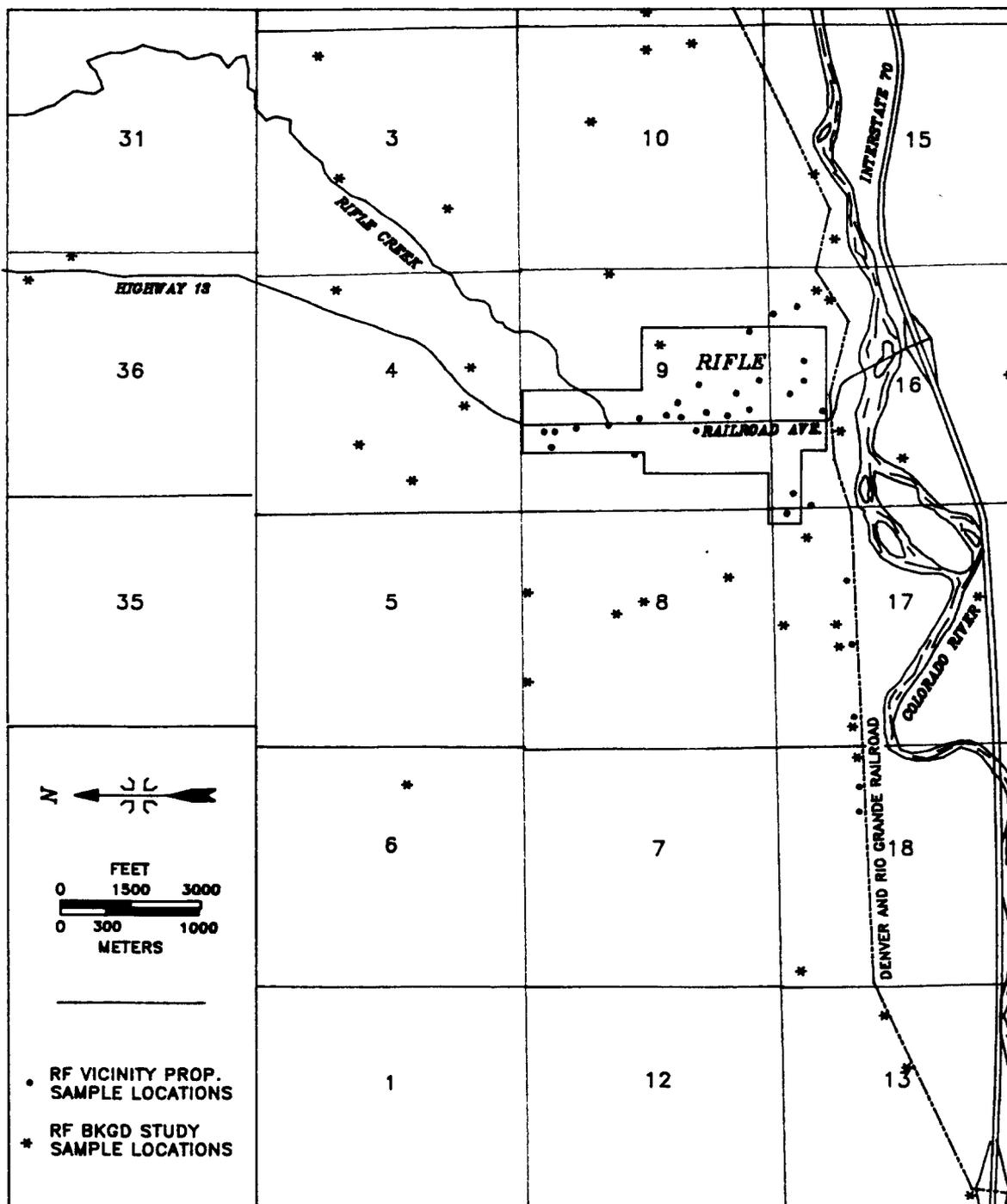


Fig. 8. Sample location map of Rifle study area.

increased exposure of the scintillometer probe to the geometry of the hole. However, earlier experience in the field had revealed that in most cases, if the subsurface gamma increased by 30% or more, a buried radioactive source, such as uranium mill tailings, was involved. However, in Rifle, the subsurface gamma exposure rate often increased more than 30%, but when the sample hole was deepened to locate the implied "hidden deposit" the rate normalized with depth in the sample hole. For example, a sample site with a surface gamma reading of 6 kcpm had a subsurface reading increasing to 10 kcpm (approximately a 67% increase). Subsequently, the sample hole was deepened to 30 cm and then to 45 cm. At both depths, the gamma exposure rate of 10 kcpm remained consistent. The soil samples were analyzed for ^{226}Ra , ^{232}Th , and ^{40}K content. No elevated concentrations were noted, thus providing no explanation for the phenomenon of increasing gamma exposure rates in the sample hole.

The guideline that requires further sampling in a location where the subsurface gamma increases by more than 30% is based on an assumption that such an increase is abnormal and indicates subsurface contamination (Little et al. 1986). This assumption arose from field experience in the Grand Junction, Colorado, area, where the Mancos Shale is the predominant underlying geologic rock formation and windblown tailings are not commonplace. However, in the Rifle area the predominant geologic formation is the Wasatch Formation, and windblown tailings are widespread. An explanation of the anomalous subsurface gamma readings is proposed later and related to the Wasatch Formation.

RESULTS

DATA REDUCTION

The surface direct measurements taken at each location using a scintillation probe were compared with those taken with the PIC (Appendix B). This comparison provided a method to convert the scintillator gamma readings in thousand counts per minute to the exposure rate in microrentgen per hour. By performing a linear regression on the data a formula was derived to convert thousand counts per minute directly to microrentgen per hour. The derivation of this conversion was necessary because the ISC vicinity property reports reference microrentgen per hour units, while the survey measurements from scintillation probes are read in thousand counts per minute.

Measurements were also taken with a GR-410 portable gamma-ray spectrometer (Appendix B) on selected locations. The GR-410 isolated the counts per minute for the three gamma spectral windows of potassium (^{40}K), radium (^{214}Bi), and thorium (^{208}Th). Measurements taken with the GR-410 provided a Ra/Th ratio, which was crucial in determining the presence of excess ^{226}Ra (i.e., uranium tailings and ore). Data from this study indicate that in areas of background radiation the Ra/Th ratio is less than 2. In areas where the Ra/Th ratio is greater than 2, ^{226}Ra was enriched in the soil. Analysis of the surface and subsurface soil samples collected from locations where direct measurements were taken provided the data for comparing the GR-410 gamma spectral values with the actual concentrations of ^{226}Ra , ^{232}Th , and ^{40}K (Appendix C, Raw Data). The concentrations of the radioactive components in the soil samples were determined in the ORNL, Grand Junction, soil analysis laboratory (Myrick et al. 1987).

Subsequent to the collection of field data and laboratory radionuclide analysis, statistical analyses were performed. Eighty-four data pairs were used in the calculations; 39 were data pairs taken at background locations, and 45 were data pairs taken at contaminated sites. A linear regression was performed on the data, with the results shown in Table 1.

Table 1. Linear regression formulas: results of linear regression performed on Rifle exposure rates

	Number of pairs	Conversion formula ^a	Correlation coefficient	Significance level
Background sites	39	$1.68x + 6.73$	0.81	<0.01
Contaminated sites	45	$1.64x + 5.52$	0.91	<0.01
All gamma data	84	$1.56x + 6.89$	0.93	<0.01

^aUsed to convert readings in kcpm (x) to $\mu\text{R}/\text{h}$.

Student's T -tests performed on these data indicate that all three formulas represent essentially the same line ($P < 0.05$). Therefore, only one formula is needed for gamma conversions from thousand counts per minute to microrentgen per hour for scintillometer readings taken in either background or contaminated surroundings in Rifle. The conversion formula (Fig. 9) selected for use in Rifle was:

$$y = 1.56x + 6.89$$

where:

x = thousand counts per minute (kcpm)

y = microrentgen per hour ($\mu\text{R}/\text{h}$)

Means and standard deviations were also calculated. The average background scintillometer reading was 5.4 kcpm, which was calculated from the 39 background measurements taken in this study. The range for background readings was from 3.8 to 7.0 kcpm, a slightly wider range than the preliminary background range previously mentioned. In comparison, the background scintillometer readings for Grand Junction vicinity properties range from 4.0 to 6.0 kcpm and average less than 5.0 kcpm. Table 2 shows the Grand Junction background rate range compared to the Rifle background rate range.

BACKGROUND GAMMA RANGES

The discovery that the average Rifle background was higher than Grand Junction background led to further comparisons. These comparisons are shown in Table 3. Background ^{226}Ra values for 20 sites in Grand Junction were compared to those from 76 sites

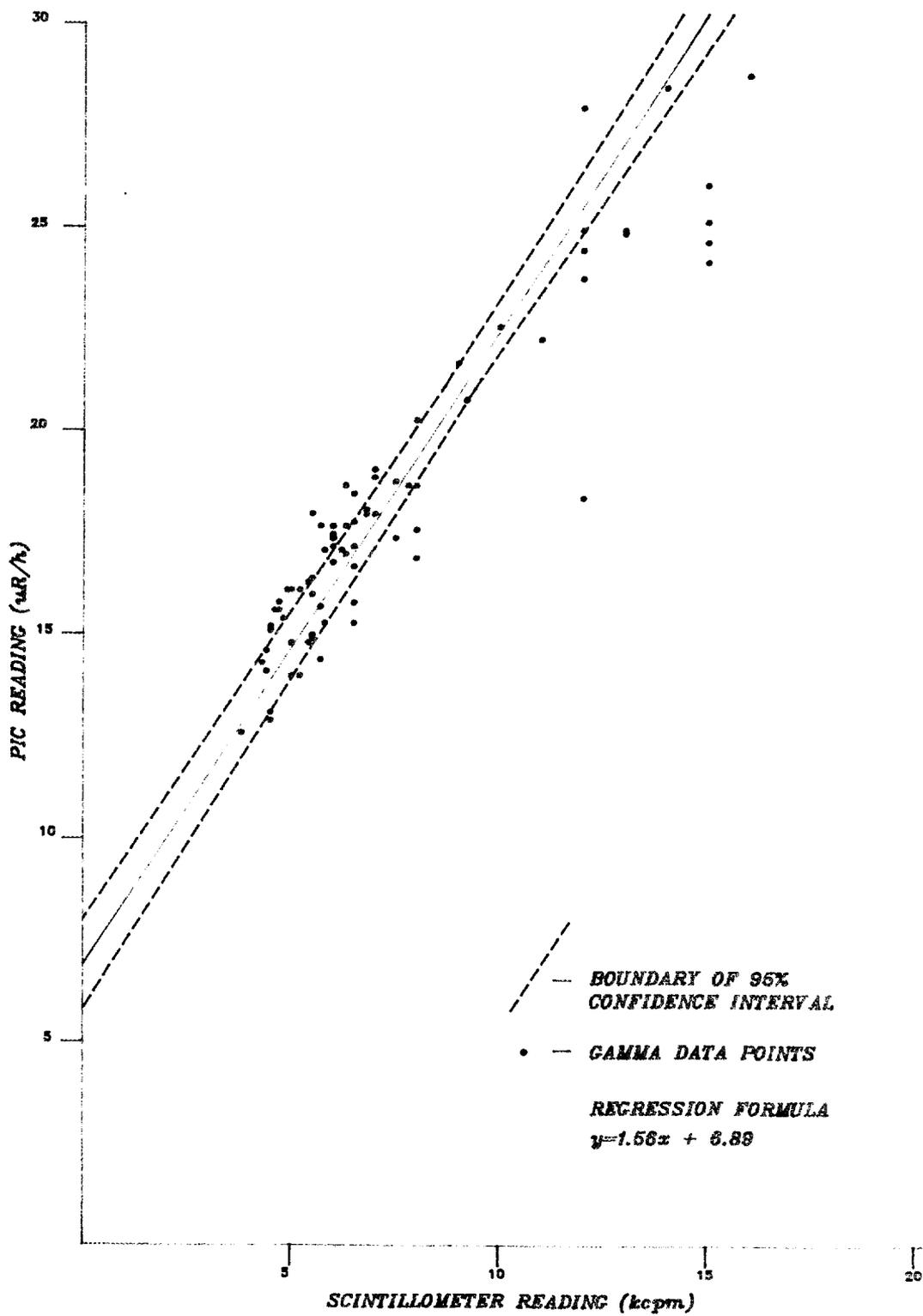


Fig. 9. Rifle background study regression curve.

Table 2. Grand Junction vs Rifle, Colorado, background gamma exposure rate ranges

	Number of readings	Scintillometer background range (kcpm)	Converted to $\mu\text{R/h}$	Mean ($\mu\text{R/h}$)	Standard deviation
Grand Junction	20	4-6	10-14	11.7 ± 2.1	2.0
Rifle	39	3.8-7	12-18	15.3 ± 2.6	2.7

Table 3. Soil radionuclide concentrations: Grand Junction and Rifle, Colorado

	Number of readings	Average background (pCi/g)		
		^{226}Ra	^{208}Th	^{40}K
Grand Junction	20	1.76 ± 0.44	1.31 ± 0.10	19.3 ± 4.7
Rifle	39	1.49 ± 0.36	1.02 ± 0.13	16.0 ± 3.2

in Rifle averaging 1.49 pCi/g and 1.76 pCi/g, respectively (Smith 1985). Thorium-232 values are also similar, averaging 1.02 pCi/g for Grand Junction and 1.31 pCi/g for Rifle. However, comparison of the ^{40}K levels presents a different picture. The average ^{40}K concentration in Grand Junction background samples is 16.0 pCi/g. In Rifle it is 19.3 pCi/g, which is significantly higher. Most soil types sampled in both Grand Junction and Rifle were high in clay. Clay soils are generally higher in potassium than sandy soils, as potassium is a major component in the minerals found in most clays. However, potassium concentrations of different clay soil types can vary considerably depending on the origin of the clays. In Grand Junction the soil was produced by weathering of the Mancos Shale, but in Rifle the Wasatch Formation was weathered to form soil. The mudstone beds of the Wasatch have abundant volcanic ash, which is relatively high in potassium and other radioactive elements. However, the Mancos shale has very few beds of volcanic ash material, and the clays deposited there tend to be higher in sodium than potassium. The reason for the difference is that the formations had different sources and Wasatch source rocks were higher in potassium (Malan and Sterling 1969). Because the ^{40}K isotope contributes the largest radioactive component to a background sample, the concentration of potassium is the main control for background gamma exposure rates. Therefore, an area with consistently high potassium concentrations in the soil will have a consistently high background gamma exposure rate. This is the case when Rifle and Grand Junction background rates are compared.

As noted earlier, the range of background gamma readings for Rifle is wider than that for Grand Junction. This relationship can be explained by the varying potassium concentrations, since potassium is the largest contributor of gamma radiation in a background sample. Concentrations of ^{40}K in different soil types found in Grand Junction and Rifle, Colorado, are given in the following table.

Wasatch sandstone and floodplain sandy soil	River terraces mixed gravel and clay	Wasatch mudstone and clay soils	Mancos Shale clay soil
10.2 ± 2.6	18.3 ± 1.3	20.3 ± 2.4	16.0 ± 3.2

Rifle area soils made of sandy material related to either the weathered sandstone beds in the Wasatch or the river terraces have much lower potassium levels and background gamma values than do soils of other materials. The sandy soils average 10.2 pCi/g of ^{40}K , and the mixed soils of the river terraces average 18.3 pCi/g. In contrast, clay soils derived from Wasatch mudstone beds increase to as high as 26.1 pCi/g of ^{40}K and average 20.3 pCi/g. In Grand Junction, vicinity properties are found on mostly one soil type averaging 16.0 pCi/g of ^{40}K . The soil is more uniform and is mostly derived from one source, the Mancos Shale. On the other hand, Rifle vicinity properties may be located on one of three geomorphic features, terraces, floodplains, or Wasatch outcrops, all with varying soil types. Therefore, the Rifle background gamma exposure rates show a wider range of fluctuation than the Grand Junction background rates display.

During routine gamma radiation surveys on Rifle vicinity properties, the widely varying background exposure rate range can be deceiving when an attempt is made to determine areas of contamination versus background areas. Normally, regions contaminated by uranium mill tailings are outlined starting with the low end of the contaminated range at 1 kcpm above background (Little et al. 1986.5). However, in Rifle, depending on the soil type at the respective location, background varies. The widespread nature of windblown tailings (Fig. 1) complicates the discrimination of areas with slightly elevated gamma exposure rates due to contamination from those areas with high-potassium clay soil.

There are two methods of differentiating between windblown mill tailings contamination and high-potassium clay soil. The first method is to examine laboratory results from soil sampling. Due to the lag time involved in receiving these data, the second method, which provides results in the field, is preferred. This method is to take gamma spectrometer measurements at each site using a Geometrics GR-410 Portable Gamma Spectrometer to determine the Ra/Th ratio. The results of this study indicate that background areas have Ra/Th ratios less than 2, while excess radium present in contaminated regions boosts the ratio to values greater than 2.

As a result of these findings, any region on a Rifle vicinity property with gamma readings greater than 6.5 kcpm that is not obviously a deposit of tailings is now checked with the portable gamma spectrometer. If the Ra/Th ratio is found to be greater than 2, then the area is soil sampled to discern the extent of windblown tailings. It should be noted that the total count of gamma readings from the GR-410 gamma spectrometer correlates very well with the counts per minute obtained using the Victoreen scintillometer. In fact, the scintillometer reading can be converted to an approximate gamma spectrometer reading using the formula:

$$y = 0.64x + 1.81$$

where:

x = the scintillometer reading in kcpm

y = the gamma spectrometer total counts in kcpm

0.89 = correlation coefficient

This correlation offers a way to perform a quick field check for the relative accuracy of the instruments.

MILL-RELATED CONTAMINATION

Mill-related materials that contaminate vicinity properties in Rifle include mill tailings hauled as fill, salvaged building materials, windblown mill tailings, and coal ash from the calcining furnace. The windblown mill tailings and coal clinkers compose most of the contamination on vicinity properties and thus warrant further discussion.

Windblown Contamination

The two tailings piles in the Rifle area lie generally south of town, one to the southeast and the other to the southwest. As previously mentioned, prevailing winds in Rifle are from the west, but they vary considerably when major storms arrive from either the southwest or northwest. The winds associated with the big storm fronts have enough velocity to capture and redistribute the sand-sized particles that compose the two tailings piles. For many years both tailings piles lay uncovered and unstabilized, and large areas downwind became covered with windblown tailings. The extent of the contaminated plumes decreases with distance from the piles, as shown in Fig. 1. This map, adapted from the EG&G aerial survey map, shows the areas of known windblown contamination with possible elevated ^{226}Ra -in-soil concentrations (Ford, Bacon, and Davis 1977). Soil sampling done during this study confirms windblown contamination in most of the areas. In addition to these major plumes of contamination, there are small isolated hot spots not shown on this map. These isolated hot spots may be the result of the "dust devils" that arise during hot, dry summer conditions. They can lift tailings several thousand feet in the air and then deposit them (usually in a southwest to northeast heading) as the dust devil diminishes. Both tailings piles have been revegetated and appear to be relatively stabilized.

Another aspect of windblown contamination concerns leaching of the surface contamination. Windblown contamination encountered during this study was sampled at the surface 5 cm and then 10 cm below. Originally it was assumed that windblown contamination would be concentrated near the surface; subsequently, the top 15-cm layer was sampled in two increments. However, it was found that the contamination was not consistently near the surface. A pattern was observed showing that the 5-cm surface sample had higher radium in regions where the only watering was from the annual precipitation, but the bottom 10-cm increment had the higher radium in regions such as lawns and gardens that receive extra water from irrigation. Apparently the increased watering in the lawn and garden areas leaches the windblown contaminants into the subsurface at a much faster rate than in unirrigated areas. Thus, the two-increment sampling method for windblown contamination should be continued. These results indicate that elevated surface ^{226}Ra values are not always necessary to prove windblown status because the contaminants do leach down. Therefore, when average surface background gamma exceeds 6.5 kcpm a gamma spectrometer reading should be taken. If the resulting Ra/Th ratio exceeds 2, windblown sampling should be performed, since the elevated Ra/Th ratio indicates tailings may be present and the elevated gamma is not from a natural source.

Coal Clinkers

Although this study was initiated to characterize the background radiation in the Rifle area, it was expanded to include the study of types of contamination and explain the anomalies. The other type of contamination, besides windblown mill tailings, of significance to Rifle vicinity property radiation surveys was radioactive coal clinkers. They have been used as fill material in several vicinity property lawns and driveways. The radioactive coal clinkers are gray-black and usually sand- to pebble-sized, cinder-like material (Fig. 10). They are brittle and usually have more than 10 pCi/g of ^{226}Ra . The Ra/Th ratio is usually lower for coal clinkers than for pure tailings but is higher than in most windblown contaminated areas. The mechanism by which the coal clinkers became contaminated in the first place is unknown, but research shows that the millsite was the source of contamination (Witt 1986). Evidence includes: (1) the testimony of several property owners who personally hauled the clinkers from the millsite onto their properties; (2) a sampling of the coal clinkers that are still at the mill site, which showed that they are contaminated; and (3) failure of a field investigation to locate anomalously radioactive coal seams at any coal mines used as fuel sources for the mill. Therefore, this material is treated as mill-related contamination, which qualifies for remedial action under the UMTRA Project. The field investigation also refutes the idea that windblown radioactive fly-ash from coal burning home furnaces was the cause of anomalous gamma exposure rates. Since none of the local coal sources were found to have above background levels of radioactivity during the field reconnaissance, it is not likely that the ash from burning local coal for home heating would be contaminated.

CONCLUSIONS

Background radiation in Wasatch Formation outcrops and Quaternary alluvial deposits was investigated around Rifle, and many samples were taken from various mudstones,

ORNL-PHOTO 10054-87



Fig. 10. Photograph of radioactive coal clinkers along Highway 6 and 24, north of the "old" tailings pile.

sandstone, and mixed soils. The sandstones had uniformly low surface gamma values, and ^{40}K and ^{226}Ra concentrations were also low. However, the mudstones were much different. All of the mudstones had higher gamma exposure rates and ^{40}K than did the sandstones, and some had elevated ^{226}Ra even though they were miles from the tailings piles. These anomalous mudstone outcrops were characterized as having subsurface gamma readings that rose disproportionately to the increase expected from the geometry of the sample hole. As stated in the background discussion, the elevated gamma rates from ^{40}K and ^{226}Ra in the Wasatch mudstones are the result of the origin of the material. Additionally, since the soils in the region were principally derived from the Wasatch Formation, they vary accordingly.

When the initial radiological surveys were performed at Rifle these relationships were unknown, thus causing difficulty in differentiating background radiation from contaminated regions. The corrective procedure outlined in the previous section has been implemented, and this has dispelled the confusion in delineating areas of background radiation and areas of contamination due to mill-related materials in Rifle, Colorado.

SUMMARY

Several interrelated findings result from the study of background gamma radiation in Rifle. First, a formula was derived for converting scintillometer counts per minute to microrentgen per hour for the Rifle area. Second, the procedure for using the portable gamma spectrometer to discern the areas of windblown contamination was instituted. Additionally, the portable gamma spectrometer was found to be an excellent tool for separating background from contaminated regions by simply calculating the in-situ Ra/Th ratio. In all cases where the Ra/Th ratio was less than 2 the ^{226}Ra -in-soil concentration was near the background average for Rifle. Third, an explanation was presented for the unusual mix of background gamma exposure rates encountered due to the varying ^{40}K concentrations and naturally occurring radium anomalies found in the soil and rock units related to the Wasatch Formation. Finally, radioactive coal clinkers were identified as a mill product found throughout the study area used as backfill, not as windblown fly-ash contamination, thus qualifying it for UMTRA Project remediation.

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APPENDIX A

SAMPLING AND ANALYTICAL EQUIPMENT

The display or description of a specific product is not to be construed as an endorsement for that product or its manufacturer by the authors or their employer (please read disclaimer on the inside front cover of this document).

A. Direct Radiation Measurements

Victoreen portable rate meter, model 490 THYAC III

Reuter-Stokes pressurized ionization chamber, model RSS-111

Geometrics Exploranium model GR-410 portable gamma-ray spectrometer
coupled with GPX-21 (3 in. \times 3 in.) NaI(Tl)
4-channel portable gamma-ray spectrometer

B. Laboratory Analyses

NaI(Tl) well crystal in lead pig with hydraulic lifting unit coupled with:
ORTEC model 113 preamplifier
ORTEC model 490B amplifier
ND575 model 456 high voltage supply
ND-66 multichannel analyzer
IBM PC portable computer
Texas Instruments model 855 printer

APPENDIX B

MEASUREMENT AND ANALYTICAL PROCEDURES

Gamma exposure rate measurements were obtained using a Victoreen model 490 Thyac III scintillation probe containing 3.2 cm × 3.8 cm NaI(Tl) scintillation crystals. Count rates in thousand counts per minute were converted to exposure rates in microroentgens per hour using factors determined by comparing the response of the scintillation detector with that of a Reuter-Stokes model RSS-111 pressurized ionization chamber (PIC) at sample locations (Little et al. 1986).

Gamma Spectrometry

Gamma spectral data were obtained using a Geometrics Exploranium model GR-410 portable gamma ray spectrometer coupled with GPX 21 [7.6 cm × 7.6 cm (3 in. × 3 in.)] NaI(Tl). These measurements were actually taken at each sample site along with the PIC and scintillometer readings.

Calibrated for gross counts between 0.5 and 3.0 MeV

^{226}Ra : 176 MeV gamma of ^{214}Bi
 ^{40}K : 1.46 MeV gamma of ^{40}K
 ^{232}Th : 2.62 MeV gamma of ^{208}Tl

Soil Sample Analysis

Soil samples were dried, ground to an even consistency, and placed in a plastic sample bottle. Samples were held for 12 to 16 days to provide a radon in-growth period. The samples were then analyzed using the KRTCOM gamma analysis program which estimated the activity concentration of ^{226}Ra , ^{40}K , and ^{232}Th (measured in pCi/g) for a NaI gamma spectrum (Myrick et al. 1987). The program stored the raw spectrum and provided a database for the results which provided rapid estimation of activity concentrations.

APPENDIX C

RAW DATA

The data collected in this study were put into table form for statistical analysis. An explanation of the data fields is provided below:

LOCNO:	Location number as shown on sample location map and sample number
ADDRESS:	Description of sample location
SOCODE:	Sample source, either BK for background or CT for contaminated
REMARK 1:	Windblown mill tailings (WB) or anomalous (AN) or coal ash (CA)
SODEF:	Source definition, either alluvial mudstone (ALMS), Tertiary Wasatch mudstone (TWMS), mixed alluvial clay and gravel (ALMG), Tertiary Wasatch sandstone (TWSS), coal ash (CA)
SAMPNO:	Sample number either S1 or S2 for first or second sample, and third character either A, B, C, or D, denoting depth interval. A = 0-15 cm, B = 15-30 cm, C = 0-5 cm, and D = 5-15 cm
SAMPDEPT:	Sample depth in centimeters (as above)
KCPM:	Scintillometer reading at surface in kcpm
URH:	Direct conversion of kcpm to $\mu\text{R}/\text{h}$
PIC:	Surface reading in $\mu\text{R}/\text{h}$ from pressurized ionization chamber
GSTC:	Gamma spectral total counts from GR-410
GSK:	Gamma spectral potassium counts from GR-410
GSRA:	Gamma spectral radium counts from GR-410
GSTH:	Gamma spectral thorium counts from GR-410
LABK:	Laboratory potassium concentration in pCi/g
LABRA:	Laboratory ^{226}Ra concentration in pCi/g
LABTH:	Laboratory thorium concentration in pCi/g
LABRATH:	Radium to thorium ratio of lab concentrations
GSRA/TH:	Radium to thorium ratio from GR-410 readings

SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	12.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	28.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	28.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00019S1A	ADDRESS:	531 EAST AV				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	5.5	GSK:	525	GSRA:	138	GSTH:	101
URH:	16.0	LABK:	19.80	LABRA:	2.76	LABTH:	1.48
PIC:	16.0	LABRATH:	1.97	GSRA/TH:	1.40		
GSTC:	5230						
LOCNO:	RF00019S1B	ADDRESS:	531 EAST AV				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	7.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	21.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00021S1C	ADDRESS:	564 JARRAD				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	6.8	GSK:	666	GSRA:	197	GSTH:	142
URH:	18.1	LABK:	20.60	LABRA:	3.14	LABTH:	1.45
PIC:	18.1	LABRATH:	2.17	GSRA/TH:	1.39		
GSTC:	7680						
LOCNO:	RF00021S1D	ADDRESS:	564 JARRAD				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	11.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	28.9	LABK:	22.70	LABRA:	3.48	LABTH:	1.45
PIC:	0.0	LABRATH:	2.40	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00021S2C	ADDRESS:	564 JARRAD				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S2C	SAMPDEPT:	0-5				
KCPM:	7.5	GSK:	681	GSRA:	258	GSTH:	109
URH:	20.0	LABK:	23.90	LABRA:	5.08	LABTH:	1.11
PIC:	0.0	LABRATH:	4.58	GSRA/TH:	2.37		
GSTC:	8210						
LOCNO:	RF00021S2D	ADDRESS:	564 JARRAD				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S2D	SAMPDEPT:	5-15				
KCPM:	11.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	28.9	LABK:	22.10	LABRA:	5.08	LABTH:	1.05
PIC:	0.0	LABRATH:	3.39	GSRA/TH:	0.00		
GSTC:	0						

SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	25.0	GSK:	1431	GSRA:	1137	GSTH:	120
URH:	47.8	LABK:	18.10	LABRA:	1.45	LABTH:	1.00
PIC:	47.8	LABRATH:	1.45	GSRA/TH:	9.50		
GSTC:	23990						

LOCNO:	RF00026S1B	ADDRESS:	703 RAILROAD AVE				
SOCODE:	CT	REMARK1:	0	SODEF:	ALMG		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	35.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	67.0	LABK:	20.50	LABRA:	1.84	LABTH:	0.74
PIC:	0.0	LABRATH:	2.49	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00026S2A	ADDRESS:	703 RAILROAD AVE				
SOCODE:	CT	REMARK1:	0	SODEF:	ALMG		
SAMPNO:	S2A	SAMPDEPT:	0-15				
KCPM:	15.0	GSK:	681	GSRA:	258	GSTH:	109
URH:	29.0	LABK:	20.50	LABRA:	2.13	LABTH:	1.03
PIC:	0.0	LABRATH:	2.07	GSRA/TH:	2.37		
GSTC:	8210						

LOCNO:	RF00026S2B	ADDRESS:	703 RAILROAD AVE				
SOCODE:	CT	REMARK1:		SODEF:	ALMG		
SAMPNO:	S2B	SAMPDEPT:	15-30				
KCPM:	110.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	211.0	LABK:	23.80	LABRA:	264.00	LABTH:	1.00
PIC:	0.0	LABRATH:	99.99	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00026S3A	ADDRESS:	703 RAILROAD AVE				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S3A	SAMPDEPT:	0-15				
KCPM:	5.8	GSK:	0	GSRA:	0	GSTH:	0
URH:	15.3	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	15.3	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00061S1A	ADDRESS:	328 E 5TH				
SOCODE:	BK	REMARK1:	AN	SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	6.3	GSK:	475	GSRA:	222	GSTH:	86
URH:	17.7	LABK:	23.40	LABRA:	2.66	LABTH:	1.65
PIC:	17.7	LABRATH:	1.60	GSRA/TH:	2.60		
GSTC:	5620						

LOCNO:	RF00061S1B	ADDRESS:	328 E 5TH				
SOCODE:	BK	REMARK1:	AN	SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	8.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	22.5	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	7.5	GSK:	594	GSRA:	189	GSTH:	115
URH:	17.4	LABK:	23.70	LABRA:	3.12	LABTH:	1.65
PIC:	17.4	LABRATH:	1.89	GSRA/TH:	1.64		
GSTC:	7000						
LOCNO:	RF00062S1D	ADDRESS:	707 E. 5TH STREET				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	10.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	24.0	LABK:	23.30	LABRA:	3.10	LABTH:	1.46
PIC:	0.0	LABRATH:	2.12	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00062S1D	ADDRESS:	707 EAST 5TH ST.				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	10.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	24.0	LABK:	23.60	LABRA:	3.89	LABTH:	1.56
PIC:	0.0	LABRATH:	2.49	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00062S2C	ADDRESS:	707 E. 5TH ST.				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S2C	SAMPDEPT:	0-5				
KCPM:	7.8	GSK:	678	GSRA:	213	GSTH:	130
URH:	18.5	LABK:	23.00	LABRA:	3.52	LABTH:	1.45
PIC:	18.7	LABRATH:	2.43	GSRA/TH:	1.64		
GSTC:	7780						
LOCNO:	RF00069S1A	ADDRESS:	236 FAIRWAY AVENUE				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	6.5	GSK:	552	GSRA:	218	GSTH:	107
URH:	18.5	LABK:	23.00	LABRA:	2.94	LABTH:	1.75
PIC:	18.5	LABRATH:	1.70	GSRA/TH:	2.00		
GSTC:	6110						
LOCNO:	RF00069S1B	ADDRESS:	236 FAIRWAY AV.				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	10.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	28.5	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00077S1A	ADDRESS:	1217 HOWARD AVE				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	5.0	GSK:	421	GSRA:	115	GSTH:	81
URH:	14.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	14.0	LABRATH:	0.00	GSRA/TH:	1.42		
GSTC:	5250						

SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	6.5	GSK:	449	GSRA:	202	GSTH:	97
URH:	15.3	LABK:	20.90	LABRA:	2.62	LABTH:	1.46
PIC:	15.3	LABRATH:	1.79	GSRA/TH:	2.10		
GSTC:	6560						

LOCNO:	RF00079S1D	ADDRESS:	302 HUTTON				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	11.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	26.0	LABK:	21.80	LABRA:	3.06	LABTH:	1.58
PIC:	0.0	LABRATH:	1.94	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00079S2C	ADDRESS:	302 HUTTON				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S2C	SAMPDEPT:	0-5				
KCPM:	6.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	15.3	LABK:	23.20	LABRA:	3.49	LABTH:	1.78
PIC:	0.0	LABRATH:	2.09	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00079S2D	ADDRESS:	302 HUTTON				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S2D	SAMPDEPT:	5-15				
KCPM:	10.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	24.0	LABK:	23.10	LABRA:	3.18	LABTH:	1.61
PIC:	0.0	LABRATH:	1.98	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00088S1C	ADDRESS:	24081 HWY 6 AND 24				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMG		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	12.0	GSK:	552	GSRA:	262	GSTH:	75
URH:	18.4	LABK:	15.50	LABRA:	2.90	LABTH:	0.87
PIC:	18.4	LABRATH:	3.33	GSRA/TH:	3.50		
GSTC:	8230						

LOCNO:	RF00088S1D	ADDRESS:	24081 HWY 6 AND 24				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMG		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	9.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	14.0	LABK:	16.90	LABRA:	2.89	LABTH:	0.92
PIC:	0.0	LABRATH:	3.14	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00090S1C	ADDRESS:	24151 HWY 6 AND 24				
SOCODE:	CT	REMARK1:	WB	SODEF:	AIMS		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	15.0	GSK:	714	GSRA:	488	GSTH:	95
URH:	25.2	LABK:	21.20	LABRA:	12.30	LABTH:	1.33
PIC:	25.2	LABRATH:	9.25	GSRA/TH:	5.13		
GSTC:	11210						

SAMPNO:	S1D	SAMPDEPT:	5-15	GSRA:	0	GSTH:	0
KCPM:	16.0	GSK:	0	LABRA:	17.50	LABTH:	1.44
URH:	26.7	LABK:	21.20	GSRA/TH:	0.00		
PIC:	0.0	LABRATH:	12.15				
GSTC:	0						
LOCNO:	RF00090S2C	ADDRESS:	24151 HWY 6 AND 24				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S2C	SAMPDEPT:	0-5				
KCPM:	15.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	25.2	LABK:	19.40	LABRA:	39.80	LABTH:	1.26
PIC:	0.0	LABRATH:	31.59	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00090S2D	ADDRESS:	24151 HWY 6 AND 24				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S2D	SAMPDEPT:	5-15				
KCPM:	14.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	23.3	LABK:	19.80	LABRA:	8.64	LABTH:	0.80
PIC:	0.0	LABRATH:	10.80	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00092S1C	ADDRESS:	24207 HWY 6 AND 24				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMG		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	11.0	GSK:	605	GSRA:	317	GSTH:	81
URH:	22.3	LABK:	20.90	LABRA:	3.10	LABTH:	1.88
PIC:	22.3	LABRATH:	1.65	GSRA/TH:	3.80		
GSTC:	8780						
LOCNO:	RF00092S1D	ADDRESS:	24207 HWY 6 AND 24				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMG		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	13.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	26.5	LABK:	19.40	LABRA:	11.60	LABTH:	1.07
PIC:	0.0	LABRATH:	10.84	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00097S1C	ADDRESS:	27341 HWY 6 AND 24				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	13.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	25.0	LABK:	16.80	LABRA:	5.54	LABTH:	0.79
PIC:	25.0	LABRATH:	7.01	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00097S1D	ADDRESS:	24341 HWY 6 AND 24				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	0.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	0.0	LABK:	19.90	LABRA:	9.11	LABTH:	1.38
PIC:	0.0	LABRATH:	6.60	GSRA/TH:	0.00		
GSTC:	0						

SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	4.7	GSK:	478	GSRA:	110	GSTH:	63
URH:	16.0	LABK:	15.80	LABRA:	1.18	LABTH:	1.14
PIC:	15.8	LABRATH:	1.00	GSRA/TH:	1.70		
GSTC:	4120						

LOCNO:	RF00155S1A	ADDRESS:	734 RAILROAD AVE				
SOCODE:	BK	REMARK1:	AN	SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	5.2	GSK:	491	GSRA:	139	GSTH:	69
URH:	16.1	LABK:	18.90	LABRA:	2.70	LABTH:	1.03
PIC:	16.1	LABRATH:	2.60	GSRA/TH:	2.00		
GSTC:	4640						

LOCNO:	RF00155S1B	ADDRESS:	734 RAILROAD AVE				
SOCODE:	BK	REMARK1:	AN	SODEF:	AIMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	20.1	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00159S1A	ADDRESS:	837 RAILROAD AVE				
SOCODE:	BK	REMARK1:		SODEF:	ALMG		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	4.4	GSK:	428	GSRA:	112	GSTH:	79
URH:	14.0	LABK:	17.40	LABRA:	1.11	LABTH:	1.01
PIC:	14.1	LABRATH:	1.10	GSRA/TH:	1.40		
GSTC:	3940						

LOCNO:	RF00159S1A	ADDRESS:	837 RAILROAD AVE				
SOCODE:	BK	REMARK1:		SODEF:	ALMG		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.2	GSK:	0	GSRA:	0	GSTH:	0
URH:	21.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00159S1B	ADDRESS:	827 RAILROAD AVE				
SOCODE:	BK	REMARK1:		SODEF:	ALMG		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	17.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00161S1A	ADDRESS:	218 ASH AVENUE				
SOCODE:	CT	REMARK1:	WB	SODEF:	AIMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	12.0	GSK:	687	GSRA:	445	GSTH:	142
URH:	23.8	LABK:	18.00	LABRA:	12.90	LABTH:	1.70
PIC:	23.8	LABRATH:	7.60	GSRA/TH:	3.10		
GSTC:	9480						

SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	20.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	40.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00163S1A	ADDRESS:	998 RAILROAD AVE				
SOCODE:	CT	REMARK1:	AN	SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	5.4	GSK:	535	GSRA:	157	GSTH:	77
URH:	16.3	LABK:	18.30	LABRA:	4.47	LABTH:	1.01
PIC:	16.3	LABRATH:	4.40	GSRA/TH:	2.00		
GSTC:	5340						
LOCNO:	RF00163S1B	ADDRESS:	998 RAILROAD AVE				
SOCODE:	CT	REMARK1:	AN	SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	11.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	33.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00164S1A	ADDRESS:	1200 RAILROAD AVENUE				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	4.4	GSK:	455	GSRA:	133	GSTH:	88
URH:	14.6	LABK:	20.40	LABRA:	1.24	LABTH:	1.12
PIC:	14.6	LABRATH:	1.10	GSRA/TH:	1.50		
GSTC:	4180						
LOCNO:	RF00164S1B	ADDRESS:	1200 RAILROAD AVE				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.3	GSK:	0	GSRA:	0	GSTH:	0
URH:	21.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00168S1A	ADDRESS:	1595 RAILROAD AVENUE				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	4.7	GSK:	448	GSRA:	128	GSTH:	73
URH:	16.0	LABK:	17.10	LABRA:	1.86	LABTH:	1.05
PIC:	15.6	LABRATH:	1.80	GSRA/TH:	1.70		
GSTC:	4490						
LOCNO:	RF00168S1B	ADDRESS:	1595 RAILROAD AVE				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	20.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

SAMPNO:	S1A	SAMPDEPT:	0-15			
KCPM:	4.5	GSK:	419	GSRA:	113	GSTH: 70
URH:	13.1	LABK:	0.00	LABRA:	0.00	LABTH: 0.00
PIC:	13.1	LABRATH:	0.00	GSRA/TH:	1.60	
GSTC:	5200					

LOCNO:	RF00194S1A	ADDRESS:	323 WHITE RIVER AVE			
SOCODE:	BK	REMARK1:	0	SODEF:	ALMG	
SAMPNO:	S1A	SAMPDEPT:	0-15			
KCPM:	5.0	GSK:	511	GSRA:	140	GSTH: 97
URH:	15.0	LABK:	20.90	LABRA:	0.98	LABTH: 1.01
PIC:	14.8	LABRATH:	1.00	GSRA/TH:	1.40	
GSTC:	4640					

LOCNO:	RF00194S1B	ADDRESS:	323 WHITE RIVER AVE			
SOCODE:	BK	REMARK1:	0	SODEF:	ALMG	
SAMPNO:	S1B	SAMPDEPT:	15-30			
KCPM:	5.5	GSK:	0	GSRA:	0	GSTH: 0
URH:	16.0	LABK:	0.00	LABRA:	0.00	LABTH: 0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00	
GSTC:	0					

LOCNO:	RF00198S1A	ADDRESS:	617 WHITE RIVER AVE			
SOCODE:	BK	REMARK1:	0	SODEF:	ALMS	
SAMPNO:	S1A	SAMPDEPT:	0-15			
KCPM:	5.7	GSK:	589	GSRA:	164	GSTH: 96
URH:	16.0	LABK:	20.60	LABRA:	2.10	LABTH: 1.47
PIC:	15.7	LABRATH:	1.40	GSRA/TH:	1.70	
GSTC:	5480					

LOCNO:	RF00198S1B	ADDRESS:	617 WHITE RIVER AVE			
SOCODE:	BK	REMARK1:		SODEF:	ALMS	
SAMPNO:	S1B	SAMPDEPT:	15-30			
KCPM:	7.2	GSK:	0	GSRA:	0	GSTH: 0
URH:	20.0	LABK:	0.00	LABRA:	0.00	LABTH: 0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00	
GSTC:	0					

LOCNO:	RF00207S1A	ADDRESS:	838 WHITE RIVER AV			
SOCODE:	BK	REMARK1:		SODEF:	ALMG	
SAMPNO:	S1A	SAMPDEPT:	0-15			
KCPM:	5.4	GSK:	469	GSRA:	107	GSTH: 72
URH:	15.0	LABK:	18.60	LABRA:	1.28	LABTH: 1.80
PIC:	14.8	LABRATH:	0.71	GSRA/TH:	1.50	
GSTC:	4340					

LOCNO:	RF00207S1B	ADDRESS:	838 WHITE RIVER AV			
SOCODE:	BK	REMARK1:		SODEF:	ALMG	
SAMPNO:	S1B	SAMPDEPT:	15-30			
KCPM:	7.0	GSK:	0	GSRA:	0	GSTH: 0
URH:	19.4	LABK:	0.00	LABRA:	0.00	LABTH: 0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00	
GSTC:	0					

SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	6.0	GSK:	551	GSRA:	170	GSTH:	98
URH:	17.5	LABK:	18.80	LABRA:	2.72	LABTH:	1.27
PIC:	17.5	LABRATH:	2.10	GSRA/TH:	1.70		
GSTC:	5490						
LOCNO:	RF00228S1B	ADDRESS:	131 EAST 2ND AVENUE				
SOCODE:	BK	REMARK1:	AN	SODEF:	ALMG		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	7.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	21.9	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00231S1C	ADDRESS:	106 DANIEL AVE				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	6.5	GSK:	556	GSRA:	294	GSTH:	78
URH:	15.8	LABK:	18.80	LABRA:	1.80	LABTH:	1.23
PIC:	15.8	LABRATH:	1.46	GSRA/TH:	3.80		
GSTC:	7640						
LOCNO:	RF00231S1D	ADDRESS:	106 DANIEL AVE				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	7.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	17.0	LABK:	18.60	LABRA:	1.84	LABTH:	1.00
PIC:	0.0	LABRATH:	1.84	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00259S1A	ADDRESS:	105 WILL AVE				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	6.0	GSK:	491	GSRA:	183	GSTH:	92
URH:	17.2	LABK:	20.60	LABRA:	3.45	LABTH:	1.27
PIC:	17.2	LABRATH:	2.70	GSRA/TH:	2.00		
GSTC:	5170						
LOCNO:	RF00259S1B	ADDRESS:	105 WILL AVENUE				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	7.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	21.5	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	RF00272S1A	ADDRESS:	423 EAST 3RD STREET				
SOCODE:	BK	REMARK1:	0	SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	6.0	GSK:	535	GSRA:	176	GSTH:	107
URH:	16.8	LABK:	22.70	LABRA:	2.24	LABTH:	1.70
PIC:	16.8	LABRATH:	1.30	GSRA/TH:	1.60		
GSTC:	5500						

SAMPNO:	S2A	SAMPDEPT:	0-15				
KCPM:	12.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	24.5	LABK:	0.00	LABRA:	16.30	LABTH:	0.00
PIC:	24.5	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00272S3A	ADDRESS:	423 EAST 3RD STREET				
SOCODE:	CT	REMARK1:	CA	SODEF:	CA		
SAMPNO:	S3A	SAMPDEPT:	0-15				
KCPM:	12.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	24.5	LABK:	0.00	LABRA:	18.50	LABTH:	0.00
PIC:	24.5	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00305S1A	ADDRESS:	809 EAST AV				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMG		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	5.7	GSK:	534	GSRA:	214	GSTH:	81
URH:	17.7	LABK:	17.50	LABRA:	4.32	LABTH:	0.80
PIC:	17.7	LABRATH:	5.40	GSRA/TH:	2.60		
GSTC:	5650						

LOCNO:	RF00305S1B	ADDRESS:	809 EAST AV				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMG		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.8	GSK:	0	GSRA:	0	GSTH:	0
URH:	21.2	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00325S1A	ADDRESS:	332 ELM AVENUE				
SOCODE:	BK	REMARK1:	AN	SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	6.0	GSK:	521	GSRA:	198	GSTH:	116
URH:	17.7	LABK:	22.50	LABRA:	3.18	LABTH:	1.71
PIC:	17.7	LABRATH:	1.90	GSRA/TH:	1.70		
GSTC:	5280						

LOCNO:	RF00325S1B	ADDRESS:	332 ELM AVENUE				
SOCODE:	BK	REMARK1:	AN	SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	8.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	23.6	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00360S1A	ADDRESS:	135 E 10TH				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	5.0	GSK:	395	GSRA:	137	GSTH:	77
URH:	16.1	LABK:	20.90	LABRA:	1.84	LABTH:	1.26
PIC:	16.1	LABRATH:	1.50	GSRA/TH:	1.80		
GSTC:	4190						

SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.3	GSK:	0	GSRA:	0	GSTH:	0
URH:	20.3	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00365S1A	ADDRESS:	129 EAST 11TH AVENUE				
SOCODE:	BK	REMARK1:	0	SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	4.5	GSK:	398	GSRA:	123	GSTH:	72
URH:	15.1	LABK:	18.40	LABRA:	1.60	LABTH:	1.24
PIC:	15.1	LABRATH:	1.29	GSRA/TH:	1.70		
GSTC:	4040						

LOCNO:	RF00365S1B	ADDRESS:	129 EAST 11TH AVE				
SOCODE:	BK	REMARK1:	0	SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.2	GSK:	0	GSRA:	0	GSTH:	0
URH:	20.8	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00384S1A	ADDRESS:	327 EAST 3RD STREET				
SOCODE:	BK	REMARK1:	0	SODEF:	ALMG		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	5.5	GSK:	460	GSRA:	141	GSTH:	101
URH:	15.0	LABK:	17.60	LABRA:	1.63	LABTH:	1.70
PIC:	15.0	LABRATH:	1.00	GSRA/TH:	1.40		
GSTC:	4640						

LOCNO:	RF00384S1B	ADDRESS:	327 EAST 3RD STREET				
SOCODE:	BK	REMARK1:	0	SODEF:	ALMG		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	7.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	19.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00386S1A	ADDRESS:	1831 RAILROAD AVE.				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	4.3	GSK:	423	GSRA:	129	GSTH:	93
URH:	14.0	LABK:	26.10	LABRA:	1.44	LABTH:	1.15
PIC:	14.3	LABRATH:	1.20	GSRA/TH:	1.40		
GSTC:	3980						

LOCNO:	RF00387S1A	ADDRESS:	823 RAILROAD AV				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	4.8	GSK:	432	GSRA:	132	GSTH:	104
URH:	15.0	LABK:	18.90	LABRA:	2.24	LABTH:	1.80
PIC:	15.4	LABRATH:	1.30	GSRA/TH:	1.30		
GSTC:	4600						

SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.4	GSK:	0	GSRA:	0	GSTH:	0
URH:	21.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00388S1C	ADDRESS:	1214 HWY 6 AND 24				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	9.2	GSK:	731	GSRA:	385	GSTH:	87
URH:	20.8	LABK:	22.60	LABRA:	7.92	LABTH:	1.03
PIC:	20.8	LABRATH:	7.69	GSRA/TH:	4.40		
GSTC:	9820						

LOCNO:	RF00388S1D	ADDRESS:	1214 HWY 6 AND 24				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	16.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	35.5	LABK:	22.80	LABRA:	9.17	LABTH:	1.14
PIC:	0.0	LABRATH:	8.04	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	RF00388S2A	ADDRESS:	1214 HWY 6 AND 24				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S2A	SAMPDEPT:	0-15				
KCPM:	5.2	GSK:	499	GSRA:	124	GSTH:	73
URH:	14.6	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	1.69		
GSTC:	5880						

LOCNO:	RF00389S1A	ADDRESS:	1631 RAILROAD AVE				
SOCODE:	BK	REMARK1:		SODEF:	ALMG		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	4.6	GSK:	481	GSRA:	125	GSTH:	91
URH:	16.0	LABK:	18.10	LABRA:	1.07	LABTH:	1.70
PIC:	15.6	LABRATH:	0.63	GSRA/TH:	1.40		
GSTC:	4350						

LOCNO:	XR00001S1B	ADDRESS:	N OF TOWN NEAR FIRESIDE INN				
SOCODE:	BK	REMARK1:	AN	SODEF:	TWMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	7.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	19.0	LABK:	16.70	LABRA:	1.57	LABTH:	1.14
PIC:	0.0	LABRATH:	1.38	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	XR00001S1C	ADDRESS:	N OF TOWN NEAR FIRESIDE INN				
SOCODE:	BK	REMARK1:	AN	SODEF:	TWMS		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	5.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	16.0	LABK:	11.90	LABRA:	0.83	LABTH:	0.95
PIC:	0.0	LABRATH:	0.87	GSRA/TH:	0.00		
GSTC:	0						

SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	0.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	0.0	LABK:	17.10	LABRA:	1.08	LABTH:	1.34
PIC:	0.0	LABRATH:	0.80	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00002S1C	ADDRESS:	GOVT CREEK N OF FIRESIDE INN				
SOCODE:	BK	REMARK1:		SODEF:	ALMG		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	4.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	13.5	LABK:	11.00	LABRA:	0.60	LABTH:	0.79
PIC:	0.0	LABRATH:	0.75	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00002S1D	ADDRESS:	GOVT CREEK N OF FIRESIDE INN				
SOCODE:	BK	REMARK1:		SODEF:	ALMG		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	0.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	0.0	LABK:	12.00	LABRA:	0.80	LABTH:	0.66
PIC:	0.0	LABRATH:	1.20	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00002S1B	ADDRESS:	GOVT CREEK N OF FIRESIDE INN				
SOCODE:	BK	REMARK1:		SODEF:	ALMG		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	5.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	16.0	LABK:	11.40	LABRA:	0.76	LABTH:	0.80
PIC:	0.0	LABRATH:	0.95	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00003S1B	ADDRESS:	W OF TOWN NEW ROAD CUT				
SOCODE:	BK	REMARK1:		SODEF:	TWMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	8.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	21.0	LABK:	16.40	LABRA:	1.28	LABTH:	1.01
PIC:	0.0	LABRATH:	1.27	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00003S1C	ADDRESS:	W OF TOWN IN NEW ROAD CUT				
SOCODE:	BK	REMARK1:		SODEF:	TWMS		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	6.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	17.1	LABK:	16.20	LABRA:	1.13	LABTH:	1.25
PIC:	0.0	LABRATH:	0.90	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00003S1D	ADDRESS:	W OF TOWN NEW ROAD CUT				
SOCODE:	BK	REMARK1:		SODEF:	TWMS		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	0.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	0.0	LABK:	16.70	LABRA:	1.22	LABTH:	1.25
PIC:	0.0	LABRATH:	0.98	GSRA/TH:	0.00		
GSTC:	0						

SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	10.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	25.0	LABK:	13.20	LABRA:	2.85	LABTH:	1.02
PIC:	0.0	LABRATH:	2.79	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00004S1C	ADDRESS:	ACROSS HWY FROM NEW PILE				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	6.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	18.0	LABK:	10.50	LABRA:	1.03	LABTH:	0.75
PIC:	0.0	LABRATH:	1.37	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00004S1D	ADDRESS:	ACROSS HWY FROM NEW PILE				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	0.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	0.0	LABK:	12.60	LABRA:	1.57	LABTH:	0.99
PIC:	0.0	LABRATH:	1.59	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00005S1B	ADDRESS:	ROADCUT EAST OF TOWN				
SOCODE:	BK	REMARK1:		SODEF:	TWMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	8.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	21.0	LABK:	15.70	LABRA:	1.12	LABTH:	0.83
PIC:	0.0	LABRATH:	1.35	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00005S1C	ADDRESS:	ROADCUT EAST OF TOWN				
SOCODE:	BK	REMARK1:		SODEF:	TWMS		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	6.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	17.1	LABK:	15.90	LABRA:	0.93	LABTH:	1.53
PIC:	0.0	LABRATH:	0.61	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00005S1D	ADDRESS:	ROADCUT EAST OF TOWN				
SOCODE:	BK	REMARK1:		SODEF:	TWMS		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	0.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	0.0	LABK:	19.50	LABRA:	0.98	LABTH:	1.45
PIC:	0.0	LABRATH:	0.67	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00006S1B	ADDRESS:	3/4 MI W OF NEW PILE				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	7.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	19.0	LABK:	0.00	LABRA:	1.80	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	0.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	0.0	LABK:	0.00	LABRA:	1.50	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00006S1C	ADDRESS:	3/4 MI W OF NEW PILE				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	6.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	17.1	LABK:	0.00	LABRA:	2.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00007S1B	ADDRESS:	2 MILES W. OF NEW TAILINGS P.				
SOCODE:	BK	REMARK1:		SODEF:	ALMG		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	17.1	LABK:	10.50	LABRA:	1.26	LABTH:	0.68
PIC:	0.0	LABRATH:	1.85	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00007S1C	ADDRESS:	2 MILES W OF NEW TAILINGS PI.				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMG		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	5.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	16.2	LABK:	10.70	LABRA:	3.31	LABTH:	0.53
PIC:	0.0	LABRATH:	6.20	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00007S1D	ADDRESS:	2 MILES W. OF NEW TAILINGS P.				
SOCODE:	BK	REMARK1:		SODEF:	ALMG		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	0.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	0.0	LABK:	11.30	LABRA:	1.06	LABTH:	0.62
PIC:	0.0	LABRATH:	1.70	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00008S1B	ADDRESS:	HWY 13 X RIFLE CREEK				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	17.1	LABK:	16.00	LABRA:	0.76	LABTH:	1.08
PIC:	0.0	LABRATH:	1.42	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00008S1C	ADDRESS:	NORTH OF RIFLE, HWY.13 X RFCK				
SOCODE:	BK	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	4.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	14.5	LABK:	15.00	LABRA:	0.82	LABTH:	0.86
PIC:	0.0	LABRATH:	0.95	GSRA/TH:	0.00		
GSTC:	0						

SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	6.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	17.1	LABK:	14.80	LABRA:	1.05	LABTH:	0.44
PIC:	0.0	LABRATH:	2.39	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00009S1B	ADDRESS:	NORTH OF SUB, N. OF 7-11				
SOCODE:	BK	REMARK1:		SODEF:	TWSS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	5.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	16.2	LABK:	9.32	LABRA:	0.74	LABTH:	0.49
PIC:	0.0	LABRATH:	1.51	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00009S1C	ADDRESS:	NW OF SUBDIVISION N OF 7-11				
SOCODE:	BK	REMARK1:		SODEF:	TWSS		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	4.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	14.5	LABK:	10.10	LABRA:	0.92	LABTH:	0.79
PIC:	0.0	LABRATH:	1.16	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00009S1D	ADDRESS:	NW OF SUBD. N OF 7-11				
SOCODE:	BK	REMARK1:		SODEF:	TWSS		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	0.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	0.0	LABK:	9.43	LABRA:	0.70	LABTH:	0.75
PIC:	0.0	LABRATH:	0.93	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00010S1B	ADDRESS:	9TH AND ARABIAN				
SOCODE:	BK	REMARK1:		SODEF:	TWSS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	5.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	16.2	LABK:	10.90	LABRA:	1.38	LABTH:	0.63
PIC:	0.0	LABRATH:	2.20	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00010S1C	ADDRESS:	9TH AND ARABIAN AVE.				
SOCODE:	BK	REMARK1:		SODEF:	TWSS		
SAMPNO:	S1C	SAMPDEPT:	0-5				
KCPM:	4.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	14.5	LABK:	11.30	LABRA:	1.03	LABTH:	0.57
PIC:	0.0	LABRATH:	1.80	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00010S1D	ADDRESS:	9TH AND ARABIAN				
SOCODE:	BK	REMARK1:		SODEF:	TWSS		
SAMPNO:	S1D	SAMPDEPT:	5-15				
KCPM:	0.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	0.0	LABK:	11.10	LABRA:	1.16	LABTH:	0.89
PIC:	0.0	LABRATH:	1.30	GSRA/TH:	0.00		
GSTC:	0						

SAMPNO:	S1D	SAMPDEPT:	5-15	GSRA:	0	GSTH:	0
KCPM:	0.0	GSK:	0	LABRA:	1.46	LABTH:	0.92
URH:	0.0	LABK:	15.20	GSRA/TH:	0.00		
PIC:	0.0	LABRATH:	1.60				
GSTC:	0						
LOCNO:	XR00014S1A	ADDRESS:	NEAR THE FOREST SERV. OFFICE				
SOCODE:	BK	REMARK1:		SODEF:	TWSS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	3.8	GSK:	238	GSRA:	92	GSTH:	67
URH:	13.0	LABK:	7.32	LABRA:	0.78	LABTH:	0.71
PIC:	12.6	LABRATH:	1.10	GSRA/TH:	1.40		
GSTC:	3100						
LOCNO:	XR00015S1A	ADDRESS:	6 MILES N. OF NEW TAILINGS PI.				
SOCODE:	BK	REMARK1:	AN	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	7.0	GSK:	678	GSRA:	218	GSTH:	134
URH:	19.0	LABK:	23.80	LABRA:	3.35	LABTH:	1.49
PIC:	19.1	LABRATH:	2.20	GSRA/TH:	1.60		
GSTC:	6740						
LOCNO:	XR00015S1B	ADDRESS:	6 MILES N OF NEW TAILINGS PI.				
SOCODE:	BK	REMARK1:	AN	SODEF:	TWMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	12.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	32.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00016S1A	ADDRESS:	END OF WEST 3RD AVENUE				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	7.0	GSK:	607	GSRA:	245	GSTH:	111
URH:	19.0	LABK:	22.80	LABRA:	4.29	LABTH:	1.47
PIC:	18.9	LABRATH:	2.90	GSRA/TH:	2.20		
GSTC:	6630						
LOCNO:	XR00016S1B	ADDRESS:	END OF WEST 3RD AVE				
SOCODE:	CT	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	10.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	28.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00017S1A	ADDRESS:	ROAD RIGHT OF WAY, S.END ASH				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	18.0	GSK:	813	GSRA:	569	GSTH:	122
URH:	31.0	LABK:	19.70	LABRA:	16.50	LABTH:	1.37
PIC:	30.8	LABRATH:	12.00	GSRA/TH:	4.70		
GSTC:	11610						

SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	5.7	GSK:	307	GSRA:	131	GSTH:	66
URH:	14.4	LABK:	9.71	LABRA:	1.33	LABTH:	0.90
PIC:	14.4	LABRATH:	1.50	GSRA/TH:	2.00		
GSTC:	3730						
LOCNO:	XR00018S1B	ADDRESS:	NW OF RIFLE				
SOCODE:	BK	REMARK1:		SODEF:	TWSS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	5.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	12.6	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00019S1A	ADDRESS:	ROADSIDE AS PER MAP				
SOCODE:	BK	REMARK1:	AN	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	5.8	GSK:	480	GSRA:	137	GSTH:	115
URH:	17.1	LABK:	14.80	LABRA:	2.32	LABTH:	1.40
PIC:	17.1	LABRATH:	1.70	GSRA/TH:	1.20		
GSTC:	4790						
LOCNO:	XR00019S1B	ADDRESS:	ROADSIDE AS PER MAP				
SOCODE:	BK	REMARK1:	AN	SODEF:	TWMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	7.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	20.6	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00020S1A	ADDRESS:	WASATCH OUTCROP - MAP LOCATION				
SOCODE:	BK	REMARK1:		SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	4.9	GSK:	529	GSRA:	138	GSTH:	88
URH:	16.1	LABK:	14.90	LABRA:	1.01	LABTH:	0.95
PIC:	16.1	LABRATH:	1.10	GSRA/TH:	1.60		
GSTC:	4690						
LOCNO:	XR00020S1B	ADDRESS:	WASATCH OUTCROP-MAP LOC.				
SOCODE:	BK	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	5.4	GSK:	0	GSRA:	0	GSTH:	0
URH:	17.7	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00021S1A	ADDRESS:	SEE MAP FOR LOCATION				
SOCODE:	BK	REMARK1:		SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	6.3	GSK:	631	GSRA:	181	GSTH:	134
URH:	18.7	LABK:	23.30	LABRA:	1.41	LABTH:	1.39
PIC:	18.7	LABRATH:	1.10	GSRA/TH:	1.40		
GSTC:	6120						

SAMPNO:	S1B	SAMPDEPT:	15-30	GSRA:	0	GSTH:	0
KCPM:	7.5	GSK:	0	LABRA:	0.00	LABTH:	0.00
URH:	22.3	LABK:	0.00	GSRA/TH:	0.00		
PIC:	0.0	LABRATH:	0.00				
GSTC:	0						
LOCNO:	XR00022S1A	ADDRESS:	CLAYSTONE OUTCROP, SEE MAP				
SOCODE:	BK	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	6.2	GSK:	448	GSRA:	195	GSTH:	113
URH:	17.0	LABK:	17.40	LABRA:	1.40	LABTH:	1.43
PIC:	17.1	LABRATH:	1.00	GSRA/TH:	1.70		
GSTC:	5150						
LOCNO:	XR00022S1B	ADDRESS:	OUTCROP, SEE MAP				
SOCODE:	BK	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	7.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	21.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00023S1A	ADDRESS:	ROAD RIGHT OF WAY, SEE MAP				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	6.0	GSK:	473	GSRA:	186	GSTH:	94
URH:	17.0	LABK:	17.40	LABRA:	3.08	LABTH:	1.70
PIC:	17.4	LABRATH:	1.80	GSRA/TH:	2.00		
GSTC:	4970						
LOCNO:	XR00023S1B	ADDRESS:	SEE MAP				
SOCODE:	CT	REMARK1:	WB	SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	8.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	24.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00024S1A	ADDRESS:	SEE MAP				
SOCODE:	BK	REMARK1:	0	SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	4.5	GSK:	414	GSRA:	91	GSTH:	78
URH:	15.2	LABK:	19.10	LABRA:	1.70	LABTH:	1.32
PIC:	15.2	LABRATH:	1.30	GSRA/TH:	1.20		
GSTC:	4070						
LOCNO:	XR00024S1B	ADDRESS:	SEE MAP				
SOCODE:	BK	REMARK1:	0	SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.2	GSK:	0	GSRA:	0	GSTH:	0
URH:	20.9	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	5.5	GSK:	469	GSRA:	120	GSTH:	85
URH:	16.4	LABK:	19.70	LABRA:	1.69	LABTH:	1.15
PIC:	16.4	LABRATH:	1.50	GSRA/TH:	1.40		
GSTC:	4590						
LOCNO:	XR00025S1B	ADDRESS:	SEE MAP				
SOCODE:	BK	REMARK1:	0	SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	7.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	20.9	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00026S1A	ADDRESS:	SEE MAP				
SOCODE:	BK	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	6.5	GSK:	613	GSRA:	176	GSTH:	125
URH:	17.8	LABK:	27.10	LABRA:	1.13	LABTH:	1.44
PIC:	17.8	LABRATH:	0.78	GSRA/TH:	1.40		
GSTC:	5790						
LOCNO:	XR00026S1B	ADDRESS:	SEE MAP				
SOCODE:	BK	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	7.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	20.5	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00027S1A	ADDRESS:	SEE MAP				
SOCODE:	BK	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	6.0	GSK:	772	GSRA:	199	GSTH:	150
URH:	17.4	LABK:	26.10	LABRA:	1.57	LABTH:	1.80
PIC:	17.4	LABRATH:	0.87	GSRA/TH:	1.30		
GSTC:	6820						
LOCNO:	XR00027S1B	ADDRESS:	SEE MAP				
SOCODE:	BK	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	7.8	GSK:	0	GSRA:	0	GSTH:	0
URH:	22.7	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00028S1A	ADDRESS:	SEE MAP				
SOCODE:	BK	REMARK1:	0	SODEF:	ALMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	6.0	GSK:	535	GSRA:	180	GSTH:	131
URH:	17.7	LABK:	23.00	LABRA:	1.51	LABTH:	1.76
PIC:	17.7	LABRATH:	0.86	GSRA/TH:	1.40		
GSTC:	5520						

SAMPNO:	S1B	SAMPDEPT:	15-30	GSRA:	0	GSTH:	0
KCPM:	8.0	GSK:	0	LABRA:	0.00	LABTH:	0.00
URH:	23.6	LABK:	0.00	GSRA/TH:	0.00		
PIC:	0.0	LABRATH:	0.00				
GSTC:	0						

LOCNO:	XR00029S1A	ADDRESS:	SEE MAP	SODEF:	ALMS		
SOCODE:	CT	REMARK1:	WB				
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	15.0	GSK:	718	GSRA:	556	GSTH:	84
URH:	26.1	LABK:	21.80	LABRA:	26.10	LABTH:	2.10
PIC:	26.1	LABRATH:	12.40	GSRA/TH:	6.60		
GSTC:	10180						

LOCNO:	XR00029S1B	ADDRESS:	SEE MAP	SODEF:	ALMS		
SOCODE:	CT	REMARK1:	WB				
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	18.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	31.5	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	XR00030S1A	ADDRESS:	SEE MAP	SODEF:	ALMS		
SOCODE:	CT	REMARK1:	WB				
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	13.0	GSK:	814	GSRA:	505	GSTH:	106
URH:	24.9	LABK:	22.50	LABRA:	11.10	LABTH:	1.26
PIC:	24.9	LABRATH:	8.80	GSRA/TH:	4.80		
GSTC:	10000						

LOCNO:	XR00030S1B	ADDRESS:	SEE MAP	SODEF:	ALMS		
SOCODE:	CT	REMARK1:	WB				
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	13.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	24.9	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	XR00031S1A	ADDRESS:	SEE MAP FOR LOCATION	SODEF:	ALMS		
SOCODE:	CT	REMARK1:	WB				
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	7.5	GSK:	542	GSRA:	271	GSTH:	82
URH:	19.0	LABK:	19.70	LABRA:	3.75	LABTH:	1.14
PIC:	18.8	LABRATH:	3.30	GSRA/TH:	3.30		
GSTC:	6580						

LOCNO:	XR00031S1B	ADDRESS:	SEE MAP FOR LOCATION	SODEF:	ALMS		
SOCODE:	CT	REMARK1:					
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	7.2	GSK:	0	GSRA:	0	GSTH:	0
URH:	18.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

SAMPNO:	S1A	SAMPDEPT:	0-15	GSRA:	163	GSTH:	84
KCPM:	6.3	GSK:	461	LABRA:	2.99	LABTH:	0.96
URH:	17.0	LABK:	15.90	GSRA/TH:	1.90		
PIC:	17.0	LABRATH:	3.10				
GSTC:	4850						
LOCNO:	XR00032S1B	ADDRESS:	SEE MAP FOR LOCATION				
SOCODE:	CT	REMARK1:		SODEF:	ALMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	18.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00033S1A	ADDRESS:	100 YDS. ACR. HWY FROM OLD PI.				
SOCODE:	CT	REMARK1:	CA	SODEF:	CA		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	20.0	GSK:	581	GSRA:	476	GSTH:	155
URH:	34.0	LABK:	4.82	LABRA:	11.60	LABTH:	2.57
PIC:	0.0	LABRATH:	4.50	GSRA/TH:	3.10		
GSTC:	10110						
LOCNO:	XR00033S1B	ADDRESS:	100 YDS. SOUTH OF OLD PILE				
SOCODE:	CT	REMARK1:	CA	SODEF:	CA		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	19.0	GSK:	575	GSRA:	488	GSTH:	201
URH:	33.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	2.40		
GSTC:	10410						
LOCNO:	XR00034S1A	ADDRESS:	3 MILES SOUTH OF RIFLE GAP				
SOCODE:	CT	REMARK1:	CA	SODEF:	CA		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	16.0	GSK:	853	GSRA:	862	GSTH:	122
URH:	28.8	LABK:	0.00	LABRA:	32.70	LABTH:	0.00
PIC:	28.8	LABRATH:	0.00	GSRA/TH:	7.00		
GSTC:	14980						
LOCNO:	XR00034S1B	ADDRESS:	3 MILES SOUTH OF RIFLE GAP				
SOCODE:	CT	REMARK1:	CA	SODEF:	CA		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	15.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	27.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00035S1A	ADDRESS:	NORTHWEST OF PILE				
SOCODE:	BK	REMARK1:	AN	SODEF:	TWSS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	5.5	GSK:	445	GSRA:	188	GSTH:	78
URH:	14.9	LABK:	10.30	LABRA:	2.56	LABTH:	0.85
PIC:	14.9	LABRATH:	3.01	GSRA/TH:	2.40		
GSTC:	6000						

SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	7.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	18.9	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	XR00036S1A	ADDRESS:	NORTHEAST OF TOWN AT RIFLE CR.				
SOCODE:	BK	REMARK1:		SODEF:	TWSS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	5.2	GSK:	513	GSRA:	159	GSTH:	94
URH:	14.0	LABK:	14.40	LABRA:	1.28	LABTH:	1.01
PIC:	14.0	LABRATH:	1.27	GSRA/TH:	1.60		
GSTC:	6190						

LOCNO:	XR00036S1B	ADDRESS:	NORTHEAST OF TOWN AT RIFLE CR.				
SOCODE:	BK	REMARK1:		SODEF:	TWSS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	17.5	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	XR00037S1A	ADDRESS:	NORTH OF SUBDIVISION N TOWN				
SOCODE:	BK	REMARK1:		SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	5.5	GSK:	486	GSRA:	164	GSTH:	117
URH:	15.0	LABK:	14.50	LABRA:	1.44	LABTH:	1.17
PIC:	15.0	LABRATH:	1.23	GSRA/TH:	1.40		
GSTC:	6270						

LOCNO:	XR00037S1B	ADDRESS:	NORTH OF SUBDIV. NORTH OF TOWN				
SOCODE:	BK	REMARK1:		SODEF:	TWMS		
SAMPNO:	S1B	SAMPDEPT:	15-30				
KCPM:	6.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	17.6	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	0.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	XR00038S1A	ADDRESS:	1 MILE NE OF OLD PILE				
SOCODE:	BK	REMARK1:	0	SODEF:	TWSS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	4.5	GSK:	375	GSRA:	133	GSTH:	77
URH:	12.9	LABK:	9.35	LABRA:	1.10	LABTH:	0.67
PIC:	12.9	LABRATH:	1.64	GSRA/TH:	1.73		
GSTC:	5320						

LOCNO:	XR00039S1A	ADDRESS:	SEE MAP				
SOCODE:	BK	REMARK1:	AN	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0-15				
KCPM:	6.5	GSK:	619	GSRA:	215	GSTH:	120
URH:	16.7	LABK:	21.80	LABRA:	2.13	LABTH:	1.43
PIC:	16.7	LABRATH:	1.49	GSRA/TH:	1.79		
GSTC:	7770						

SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	8.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	16.9	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	16.9	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00052S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	15.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	24.7	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	24.7	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00052S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	15.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	24.2	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	24.2	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00054S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	5.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	18.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	18.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00056S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	6.8	GSK:	0	GSRA:	0	GSTH:	0
URH:	18.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	18.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00057S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	12.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	25.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	25.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00059S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	6.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	17.2	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	17.2	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	8.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	18.7	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	18.7	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	XR00061S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	10.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	22.6	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	22.6	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	XR00062S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	8.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	17.6	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	17.6	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	XR00063S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	26.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	66.8	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	66.8	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	XR00064S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	19.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	40.2	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	40.2	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	XR00065S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	7.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	18.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	18.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

LOCNO:	XR00066S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	14.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	28.5	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	28.5	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

SAMPNO:	S1A	SAMPDEPT:	0	GSRA:	0	GSTH:	0
KCPM:	25.0	GSK:	0	LABRA:	0.00	LABTH:	0.00
URH:	41.4	LABK:	0.00	GSRA/TH:	0.00		
PIC:	41.4	LABRATH:	0.00				
GSTC:	0						
LOCNO:	XR00068S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	9.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	21.7	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	21.7	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00069S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	8.0	GSK:	0	GSRA:	0	GSTH:	0
URH:	20.3	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	20.3	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						
LOCNO:	XR00058S1A	ADDRESS:	UNKNOWN				
SOCODE:	CT	REMARK1:	0	SODEF:	TWMS		
SAMPNO:	S1A	SAMPDEPT:	0				
KCPM:	5.5	GSK:	0	GSRA:	0	GSTH:	0
URH:	15.0	LABK:	0.00	LABRA:	0.00	LABTH:	0.00
PIC:	15.0	LABRATH:	0.00	GSRA/TH:	0.00		
GSTC:	0						

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