RADIOLOGIC AND ENGINEERING ASSESSMENT

FOR

DOE ID NO.: GJ-97002-OT - PHASE II
ADDRESS: THE 300 BLOCK OF MAIN STREET
(BOTH SIDES FROM THIRD TO FOURTH STREETS)

JUNE 1989

SUPPLEMENTAL STANDARDS

FOR

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT OFFICE

ALBUQUERQUE OPERATIONS OFFICE

DEPARTMENT OF ENERGY

BY

UNC GEOTECH
P.O. Box 14000
Grand Junction, Colorado 81502-5504

APPROVED BY Joseph E Virgona
J. VIRGONA
DOE PROJECT ENGINEER

DATE 7/6/89

G97002RE.P2:832A

1.0 INTRODUCTION

This property is a portion of the Downtown Shopping Park, located on Main Street, between Third and Fourth Streets, including the side streets from Main Street north and south to the alleys. Vicinity properties adjacent to this area include: GJ-00815-CS, GJ-00817-CS, GJ-00819-CS, GJ-00826-CS, GJ-06034-CS, GJ-00825-CS, GJ-00828-CS, GJ-00829-CS, GJ-00831-CS, GJ-00833-CS, GJ-00814-CS, GJ-00816-CS, GJ-00818-CS, GJ-00820-CS, GJ-00821-CS, GJ-00824-CS, GJ-00822-CS, and GJ-00469-CS.

The legal description is as follows: Sidewalks within the City of Grand Junction right-of-way on Main Street, between Third Street and Fourth Street; to include the east 1/2 of Third Street, between the alleys north and south of Main Street and the west 1/2 of Fourth Street, between the alleys north and south of Main Street; situated in the southwest 1/4, Section 14, T.1S, R.1W, Ute Meridian, City of Grand Junction, Mesa County, Colorado.

Phase I of the area described above included only the contaminated sidewalks, approximately 10-feet wide, which abut the buildings and are parallel to Main Street, plus the sidewalks along the cross streets. A separate Radiologic and Engineering Assessment (REA) was submitted for Phase I in January 1989. The Phase I area has been remediated.

The purpose of this assessment is to identify the estimated extent of contamination and to evaluate remedial action alternatives, including Application of Supplemental Standards, for the Main Street Phase II area. Phase II is generally defined as that area from the curb to a point approximately 10-feet in front of the buildings, along both sides of Main Street, from Third Street to Fourth Street. This area is shown as Area E on the enclosed drawing (Drawing Number 3-D97002-F2). This assessment includes estimated volumes of materials, costs for each alternative, and the recommended Phase II action.

The REA serves as an Executive Summary for the remainder of this document. Appendix A contains the radiologic Executive Summary, tables that summarize the available radiological data, and field assessment information. Appendix B is the Supplemental Standards Application and contains analysis of land use, health risks, remediation construction costs, and local agency input.

2.0 EVALUATION

There are no structures more than 50 years old within the area being considered by the Supplemental Standards Application and therefore, consideration of the National Register of Historic Places is not required.

Uranium mill tailings were used as backfill under the streets, sidewalks, and planters along Main Street. Remedial action on properties adjacent to the sidewalk will be accomplished in accordance with Radiologic and Engineering Assessments prepared specifically for each property. Field assessment radiological data provided in

Appendix A indicate the average depth of contamination in the Phase II area to be approximately 16 inches. However, Phase I remedial action revealed that the average depth is approximately 24 inches. Therefore, 24-inch depths have been shown on the drawings and used for estimating purposes.

EPA standards presented in 40 CFR 192 suggest that Application of Supplemental Standards may be appropriate in a public right-of-way, especially where utilities may be embedded in tailings. The Department of Energy (DOE) has requested that UNC Geotech consider the Application of Supplemental Standards and other alternatives for remedial action work in the Main Street area.

Alternatives examined for this Supplemental Standards Application are summarized as follows:

Alternative 1 - Complete Remediation
- Health Risk - Reduced to within EPA standards
- Construction Cost - $203,854
- Estimated Volume of Contaminated Materials Removed - 1,070 cy
- Estimated Volume of Contaminated Materials Left In Place - 0 cy

Alternative 2 - Partial Remediation
- Health Risk - Reduced to within acceptable EPA levels, except within two large planters
- Construction Cost - $193,373
- Estimated Volume of Contaminated Material Removed - 1,019 cy
- Estimated Volume of Contaminated Material Left In Place - 51 cy

Alternative 3 - No Remediation (Application of Supplemental Standards)
- Health Risk - See Appendix B, Table B.T2
- Construction Cost - $0
- Estimated Volume of Contaminated Materials Removed - 0 cy
- Estimated Volume of Contaminated Materials Left In Place - 1,070 cy

3.0 CONCLUSIONS AND RECOMMENDATIONS

Examination of the health risk analysis presented in Appendix B suggests that there are no clear present or future health risks if this Application for Supplemental Standards is approved. No change in land use is expected within the foreseeable future. There is a potential for future tailings migration from the Main Street area if this Application for Supplemental Standards is approved. The cost of remediation is excessive when no significant health risks exist.

Application of Supplemental Standards is recommended under 40 CFR 192.21 Criteria C (see Appendix B, Section B.1). A long-term tailings management, disposal, and migration control plan should be developed as soon as possible and implemented after the UMTRA Vicinity Properties Program is completed.

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APPENDIX A

RADIOLOGICAL ASSESSMENT FOR DOE ID NO. GJ-97002-OT PHASE II

(INCLUDES: GJ-00815-CS, GJ-00817-CS, GJ-00819-CS, GJ-00826-CS [GJ-06034-CS AND GJ-00825-CS], GJ-00828-CS, GJ-00829-CS [GJ-00831-CS], GJ-00833-CS, GJ-00814-CS, GJ-00816-CS, GJ-00818-CS [GJ-00820-CS], GJ-00821-CS, GJ-00824-CS, GJ-00822-CS, AND GJ-00469-CS)

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APPENDIX A
EXECUTIVE SUMMARY

1.0 INTRODUCTION

This appendix contains radiological assessment information from 13 Uranium Mill Tailings Remedial Action (UMTRA) properties. All of these assessments indicate contamination exists along the city sidewalk area. Table 1 is a list of all addresses in the 300 block on the north and south sides of Main Street.

Following procedures described in the *Field Assessment Operations Technical Data Procedures Manual*, data were collected on this property and assessed to estimate the location of residual radioactive material in excess of the Environmental Protection Agency (EPA) 'Standards for Remedial Action at Inactive Uranium Processing Sites' (40 CFR 192).

These properties have been included for remedial action consideration by UNC Geotech on the basis of spillover contamination contiguous to an included deposit on the adjoining property, and Oak Ridge National Laboratory on the basis of excess gamma exposure rate in land areas.

2.0 GAMMA EXPOSURE-RATE SURVEYS

2.1 Exterior

The high outside gamma is 59 μR/h. Areas of elevated exterior gamma exposure rates in the Phase II area are shown in Figure 1.

2.2 Interior

Not applicable - city sidewalks. However, results for adjacent properties are contained in the attachment "Appendix A's, Specific Properties."

3.0 RADON/RADON DECAY-PRODUCT CONCENTRATION (RDC)

RDC results for specific properties are shown in Figure 1 and discussed in Appendix B.

4.0 EXTENT OF CONTAMINATION

4.1 Exterior

The attachment "Appendix A's, Specific Properties," shows the location and types of explorations and radium measurements made; the related radium data are listed in the individual property tables.

Figure 1 shows the estimated boundaries of exterior contamination. The deposits containing identified residual radioactive materials include the concrete aggregate of and/or beneath the sidewalks, brick and concrete planters, in the soil in some of the planters, and in the soil beneath the paved areas. Some of the individual property assessments indicate that portions of the utility trench may be contaminated. During the Phase I remedial action construction, tailings were exposed along nearly the entire length of the trench. Therefore, for purposes of this assessment it was assumed that all of the trench is contaminated.

Individual property assessments indicate 12 inches of contamination. Based on recent remedial actions, and adding the thickness of concrete above the contamination, an average total depth of 16 inches appears appropriate.

4.2 Interior

Not applicable - city sidewalks.

5.0 REMEDIAL ACTION RECOMMENDATIONS

5.1 Exterior

See Appendix B for an evaluation of alternatives and recommendations.

5.2 Interior

Not applicable - city sidewalks.

:pr
03/30/89
04/17/89

TABLE 1

All Properties North and South of Main Street

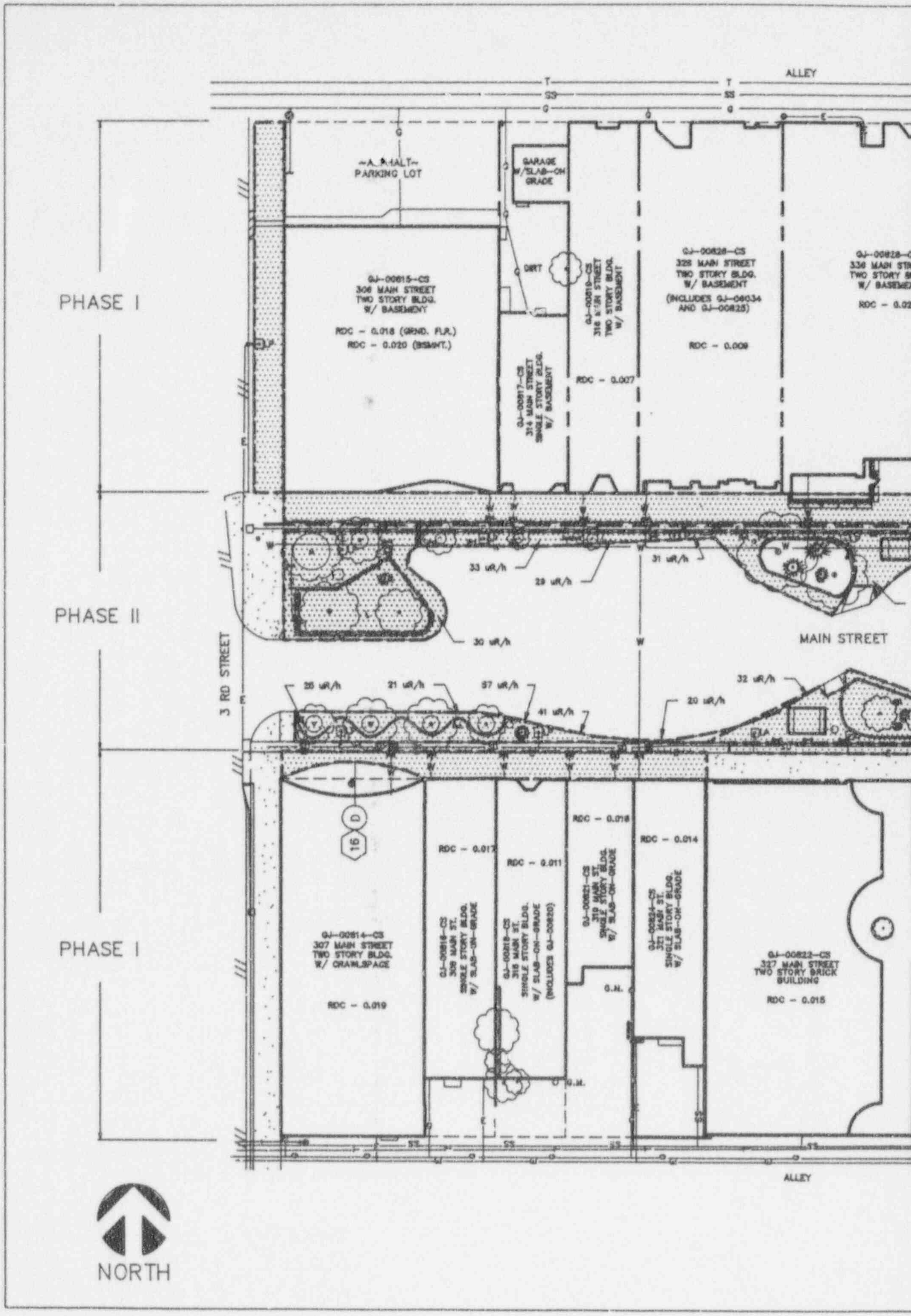
300 Block

IDENTIFICATION NUMBER	ADDRESS
NORTH SIDE	
GJ-00815-CS	306 Main Street, Grand Junction, Colorado
GJ-00817-CS	314 Main Street, Grand Junction, Colorado
GJ-00819-CS	316 Main Street, Grand Junction, Colorado
GJ-00826-CS*	326 Main Street, Grand Junction, Colorado
GJ-00828-CS	336 Main Street, Grand Junction, Colorado
GJ-00829-CS**	342 Main Street, Grand Junction, Colorado
GJ-00833-CS	362 Main Street, Grand Junction, Colorado
SOUTH SIDE	
GJ-00814-CS	307 Main Street, Grand Junction, Colorado
GJ-00816-CS	309 Main Street, Grand Junction, Colorado
GJ-00818-CS***	315 Main Street, Grand Junction, Colorado
GJ-00821-CS	319 Main Street, Grand Junction, Colorado
GJ-00824-CS	321 Main Street, Grand Junction, Colorado
GJ-00822-CS	327 Main Street, Grand Junction, Colorado
GJ-00469-CS	359 Main Street, Grand Junction, Colorado

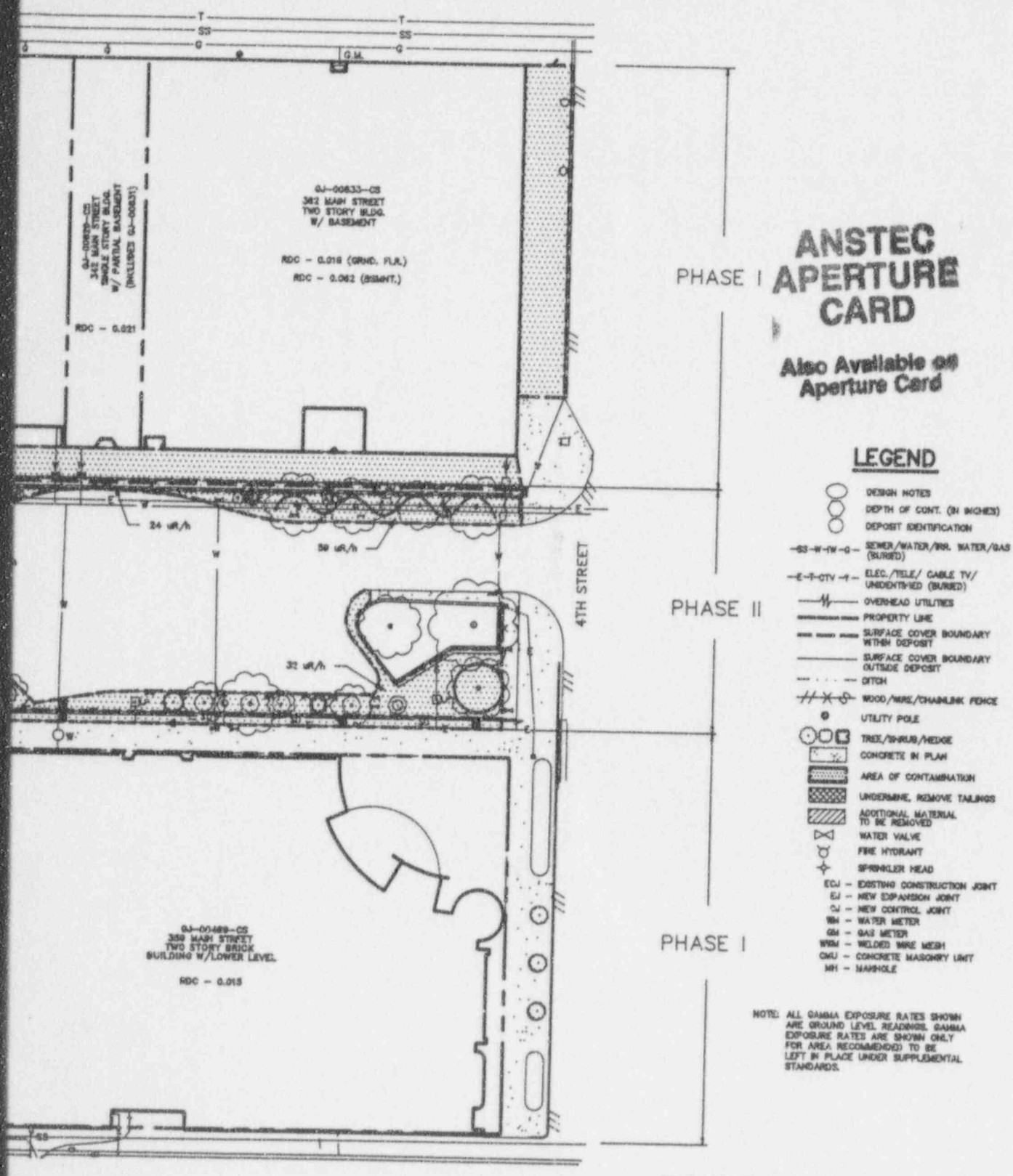
*This property includes DOE ID Numbers GJ-06034-CS and GJ-00825-CS.
**This property includes DOE ID Number GJ-00831-CS.
***This property includes DOE ID Number GJ-00820-CS.

A T T A C H M E N T

APPENDIX A's SPECIFIC PROPERTIES



ALLEY
ASPHALT PARKING LOT
GARAGE W/SLAB-ON GRADE
DIRT
GJ-00815-CS
306 MAIN STREET
TWO STORY BLDG.
W/ BASEMENT
RDC - 0.018 (GRND. FLR.)
RDC - 0.020 (BSMNT.)
GJ-00817-CS
314 MAIN STREET
SINGLE STORY BLDG.
W/ BASEMENT
GJ-00819-CS
316 MAIN STREET
TWO STORY BLDG.
W/ BASEMENT
RDC - 0.007
GJ-00826-CS
328 MAIN STREET
TWO STORY BLDG.
W/ BASEMENT
(INCLUDES GJ-00034 AND GJ-00825)
RDC - 0.009
336 MAIN STREET
W/ BASEMENT
PHASE I
PHASE II
PHASE I
33 uR/h
29 uR/h
31 uR/h
30 uR/h
MAIN STREET
3 RD STREET
25 uR/h
21 uR/h
57 uR/h
41 uR/h
20 uR/h
32 uR/h
RDC - 0.017
RDC - 0.011
RDC - 0.018
RDC - 0.014
GJ-00814-CS
307 MAIN STREET
TWO STORY BLDG.
W/ CRAWLSPACE
RDC - 0.019
GJ-00816-CS
309 MAIN ST.
SINGLE STORY BLDG.
W/ SLAB-ON-GRADE
GJ-00818-CS
315 MAIN ST.
SINGLE STORY BLDG.
W/ SLAB-ON-GRADE
(INCLUDES GJ-00820)
GJ-00821-CS
319 MAIN ST.
SINGLE STORY BLDG.
W/ SLAB-ON-GRADE
GJ-00824-CS
321 MAIN ST.
SINGLE STORY BLDG.
W/ SLAB-ON-GRADE
GJ-00822-CS
327 MAIN STREET
TWO STORY BRICK BUILDING
RDC - 0.015
ALLEY
NORTH



LEGEND

- DESIGN NOTES
- DEPTH OF CONT. (IN INCHES)
- DEPOSIT IDENTIFICATION
- SEWER/WATER/IRR. WATER/GAS (BURIED)
- ELEC./TELE/ CABLE TV/ UNIDENTIFIED (BURIED)
- OVERHEAD UTILITIES
- PROPERTY LINE
- SURFACE COVER BOUNDARY WITHIN DEPOSIT
- SURFACE COVER BOUNDARY OUTSIDE DEPOSIT
- DITCH
- WOOD/WIRE/CHAINLINK FENCE
- UTILITY POLE
- TREE/SHRUB/HEDGE
- CONCRETE IN PLAN
- AREA OF CONTAMINATION
- UNDERMINE, REMOVE TAILINGS
- ADDITIONAL MATERIAL TO BE REMOVED
- WATER VALVE
- FIRE HYDRANT
- SPRINKLER HEAD

ECJ – EXISTING CONSTRUCTION JOINT
EJ – NEW EXPANSION JOINT
CJ – NEW CONTROL JOINT
WM – WATER METER
GM – GAS METER
WWM – WELDED WIRE MESH
CMU – CONCRETE MASONRY UNIT
MH – MANHOLE

NOTE: ALL GAMMA EXPOSURE RATES SHOWN ARE GROUND LEVEL READINGS. GAMMA EXPOSURE RATES ARE SHOWN ONLY FOR AREA RECOMMENDED TO BE LEFT IN PLACE UNDER SUPPLEMENTAL STANDARDS.

FIGURE 1 -- SITE PLAN

PHASE II
GJ-97002-OT

.0 RADIOLOGIC SURVEY

3.1 Introduction

Radiologic data were collected by Bendix at DOE ID No. GJ-00815-[illegible] on November 13, 1985. Data collection methods were performed in accordance with procedures fully described in the Radiologic Support Operations Procedures Manual GJ-07(84) (Bendix Field Engineering Corporation, 1984). These data were evaluated to determine the areal and vertical extent of uranium mill tailings contamination at this property as well as any other contaminated material that may have originated from the millsite.

A review of the historical information available for this property was conducted to determine the areas of potential contamination identified during previous radiologic assessments.

The Bendix radiologic survey was designed to investigate the entire property, with emphasis on previously identified areas of contamination. Conclusions based upon data analyses are discussed in Section 3.5, Extent of Contamination. Photocopies of the Memo of Understanding, team leader notes, and Exterior Gamma Scan map are included in the Appendix (Section 6.0).

3.2 Gamma Exposure-Rate Surveys

3.2.1 Exterior Findings

Area Background: 15 uR/h
Gamma Exposure Rates Range From: 12 to 38 uR/h

Exterior gamma exposure-rate survey results are shown in Appendix Figure 3.1.

3.2.2 Interior Findings

Area Background: 14 uR/h
Gamma Exposure Rates In Habitable Areas Range From:
12 to 36 uR/h

Interior gamma exposure-rate measurements are summarized in Appendix Table 3.2.

3.3 Boreholes, Soil Samples, and Other Measurements

Area Background: 1.2 pCi/g

Areas which displayed elevated gamma levels were further investigated; the locations and types of these investigations are shown in Appendix Figure 3.2. Data from these investigations is included in Appendix Table 3.1.

3.4 Radon/Radon Daughter Concentration (RDC)

The working level was not assessed by CDH. No RDC measurements were taken by Bendix..

3.5 Extent of Contamination

Appendix Figure 3.3 shows identified areas and estimated depths of contamination on this property, based on assessments of all measurements taken. As noted in this figure, areas recommended for remedial action that contain identified residual radioactive materials are:

(Area A) Surface Material: Concrete
Direction From Primary Structure: South
Total Depth of Contamination: 12 inches
Other (height or thickness): 4-inch-thick concrete
Comments: City sidewalk
Approximate Square Footage:

(Area B) Surface Material: Concrete
Direction From Primary Structure: West
Total Depth of Contamination: 12 inches
Other (height or thickness): 4-inch-thick concrete
Comments: City sidewalk and gutter
Approximate Square Footage:

(Area C) Surface Material: Concrete
Direction From Primary Structure: South
Total Depth of Contamination: 12 inches
Other (height or thickness): 4-inch-thick concrete
Comments: This contamination may extend under the planter.
Approximate Square Footage:

(Area D) Surface Material: Soil, flowers
Direction From Primary Structure: South
Other Directions: In planter
Total Depth of Contamination: 24 inches
Comments: The depth of fill in the planter is 24 inches.
Approximate Square Footage:

(Area E) Surface Material: Brick
Direction From Primary Structure: North
Total Depth of Contamination: 12 x 24 inches
Other (height or thickness): 3-inch-thick brick
Comments: Approximately 15 bricks are contaminated. These bricks fill an old window well. The window well is approximately 12 inches high by 24 inches wide.
Approximate Square Footage:

ALLIED Bendix
Aerospace

Bendix Field Engineering Corporation
Grand Junction Operations
Grand Junction, Colorado

Date: November 13, 1985

To: Files

From: Skip Milton

Subject: Team Leader Notes - GJ-00815-CS

Address: 306 Main Street

Owner: Ray A. Meacham, 702-A
Golfmore Drive, Grand Junction, Colorado 81501

Year Built: 1916

Note:

Radon-Daughter Concentration (RDC) measurements were not taken in this location.

Team Members

S. Milton (Team Leader)
P. Hardy
V. Young
M. Duran
S. Garcia

Instruments

See Operational Equipment Summary sheet

Mike Bennett, the person in charge, gave us verbal permission to conduct the survey.

A grid was laid out around the building and out past the planter area. The reason for this is because Oak Ridge National Laboratory (ORNL) indicates contamination around the planter.

The water, gas, and electric lines were located, however, the sewer line could not be located. The sewer line can be investigated during remedial action.

Concrete construction was performed here recently. It appears to be replacement concrete, perhaps from deteriorated sections.

Deltas were performed on the new concrete to determine areal extent of possible contamination.

A concrete core at Location 255258 was taken to a clean area, and a scintillometer reading of 120 counts per second (cps) were noted.

Elevated readings were detected on the northeast corner of the primary structure. There, I (S. Milton), found a basement window well filled with what appears to be different brick than that of the original brick, a delta showed contamination there. It is believed that approximately 15 bricks are contaminated.

During the interior gamma survey of the basement, an old coal furnace room was located in the northwest corner. Approximately 15 bricks piled up in this corner showed a reading of 180 cps.

A gamma survey of the ground floor indicated elevated readings. These readings are assoicated with the contamination under the south sidewalk.

The city sidewalk showed elevated readings. Cores and deltas were performed.

A background hole was not obtainable due to asphalt and concrete cover on the entire property, however, five uncontaminated deltas were done to establish background.

All team members were alpha scanned before leaving the property.

Table 3.1
Radium Concentrations at Exterior Locations
ID #GJ-00815-CS 306 Main Street

Location #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
1	120180	00	DS	<1.0		*	On driveway/Background
2	130175	00	DS	2.8		*	On gutter
3	140180	00	DS	23.4		*	On west sidewalk
4	156180	00	DS	8.0		*	On concrete drain
5	160175	00	DS	3.6		*	On gutter
6	160180	00	DS	10.7		*	On sidewalk
		03	TC	20.4	20.4	*	Through core
		06	TC	26.8	51.0	*	
		09	TC	19.6	19.8	*	DC = 12 inches
		12	TC	12.3	6.6	*	Based on the
		15	TC	8.2	4.6	*	deconvolved data
		18	TC	6.1	4.5	*	
		21	TC	4.9	3.7	*	
		24	TC	4.4	4.0	*	
		27	TC	4.1	3.7	*	
		30	TC	4.0	3.8	*	
		33	TC	4.0	4.4	*	
		36	TC	3.8	3.6	*	
		39	TC	3.7	3.5	*	
		42	TC	3.7	3.7	*	
7	160256	[18]	DS	<1.0		*	North wall of building
		00	DS	1.8		*	Background
		08	DS	19.5		*	Horizontal
8	180180	00	DS	20.3		*	On west sidewalk
9	187175	00	DS	2.3		*	On west gutter
10	200180	00	DS	12.8		*	Sidewalk west of primary structure
11	214175	00	DS	2.3		*	On west gutter
12	220180	00	DS	8.9		*	Sidewalk west of building

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
13	240175	00	DS	3.6		*	On west gutter
14	240180	00	DS	21.6		*	On west sidewalk
		03	TC	43.5	43.5	*	Through core
		06	TC	54.3	101.9	*	
		09	TC	38.3	35.3	*	DC = 12 inches
		12	TC	24.0	12.6	*	Based on the
		15	TC	16.1	10.2	*	deconvolved data
		18	TC	11.5	7.1	*	
		21	TC	9.4	7.3	*	
		24	TC	8.5	8.5	*	
		27	TC	7.6	6.9	*	
		30	TC	7.1	7.6	*	
		33	TC	6.3	5.6	*	
		36	TC	5.9	5.9	*	
		39	TC	5.5	5.7	*	
		42	TC	5.0	4.6	*	
		45	TC	4.7	4.3	*	
		48	TC	4.6	4.6	*	
[redacted]	246237	00	DS	1.1		*	In south entryway Background
16	255180	00	DS	<1.0		*	On concrete cobble Background
17	255203	00	DS	7.6		*	On south sidewalk
18	255215	00	DS	18.5		*	On south sidewalk
		03	TC	26.8	26.8	*	Through core
		06	TC	34.6	66.2	*	
		09	TC	24.6	24.1	*	DC = 12 inches
		12	TC	14.9	6.9	*	Based on the
		15	TC	9.7	5.4	*	deconvolved data
		18	TC	6.9	4.1	*	
		21	TC	5.7	4.5	*	
		24	TC	5.2	4.8	*	
		27	TC	4.9	4.5	*	
		30	TC	4.8	4.6	*	
		33	TC	4.8	5.0	*	
		36	TC	4.7	4.3	*	
		39	TC	4.8	5.3	*	
		42	TC	4.6	4.2	*	

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
18	255215	45	TC	4.6	4.6	*	
		48	TC	4.6	4.6	*	
		51	TC	4.6	4.6	*	
19	255236	00	DS	23.5		*	On south sidewalk
20	255258	00	DS	20.8		*	On sidewalk
		03	TC	35.7	35.7	*	Through core
		06	TC	37.4	67.6	*	
		09	TC	22.1	9.7	*	DC = 12 inches
		12	TC	13.8	7.0	*	Based on the
		15	TC	9.3	5.7	*	deconvolved data
		18	TC	6.8	4.1	*	
		21	TC	5.8	4.9	*	
		24	TC	5.3	4.9	*	
		27	TC	5.0	4.3	*	
		30	TC	5.1	5.6	*	
		33	TC	4.9	4.7	*	
		36	TC	4.8	4.6	*	
		39	TC	4.8	5.0	*	
		42	TC	4.7	4.7	*	
		45	TC	4.6	4.4	*	
		48	TC	4.6	4.6	*	
21	260200	00	DS	5.1		*	On concrete cobble
22	261242	00	DS	3.1		*	On new concrete
23	261258	00	DS	6.2		*	On new concrete
24	265232	00	DS	1.2		*	New concrete
25	270220	00	DS	11.8		*	On sidewalk
		03	TC	22.3	22.3	*	Through core
		06	TC	25.6	46.6	*	
		09	TC	17.1	12.3	*	DC = 12 inches
		12	TC	11.3	6.1	*	Based on the
		15	TC	8.4	6.1	*	deconvolved data
		18	TC	6.8	5.0	*	
		21	TC	6.2	5.7	*	
		24	TC	5.9	6.1	*	
		27	TC	5.5	6.2	*	

Table 3.1
Radium Concentrations at Exterior Locations
ID #GJ-00815-CS 306 Main Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
25	270220	30	TC	4.7	4.2	*	
		33	TC	4.2	3.3	*	
		36	TC	4.2	4.6	*	
		39	TC	4.0	4.0	*	
26	280200	00	DS	10.4		*	On south sidewalk
27	280210	00	DS	3.3		*	On south sidewalk
28	295231	00	DS	4.1		*	South in planter
		06	DS	6.4		*	Visible tailings at
		18	DS	4.1		*	12 inches

Measurement Types:
GB = GAD-6 Borehole
GS = GAD-6 Surface
DS = Delta Scintillometer
TC = Total Count Borehole
SS = Soil Sample
DH = Downhole Scintillometer

Notes:
DC = Depth of Contamination
* = No Soil Sample Taken
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 11-13-85
Team Leader = SM

Table 3.2

Summary of Interior Gamma Exposure Rates

DOE ID No. GJ-00815-CS 306 Main Street

[redacted]tion	Number of Readings Taken at Waist Level	Range at Waist Level (uR/h)	Mean at Waist Level (uR/h)	Number of Readings Taken at Surface	Range at Surface (uR/h)	Mean Surface (uR/h)
Basement	*	*	*	*	12-19	*
Ground Floor	05	15-20	17	06	14-36	27
Ground Floor	*	*	*	*	12-15	*

* A walking gamma scan was performed to confirm the absence of interior contamination.

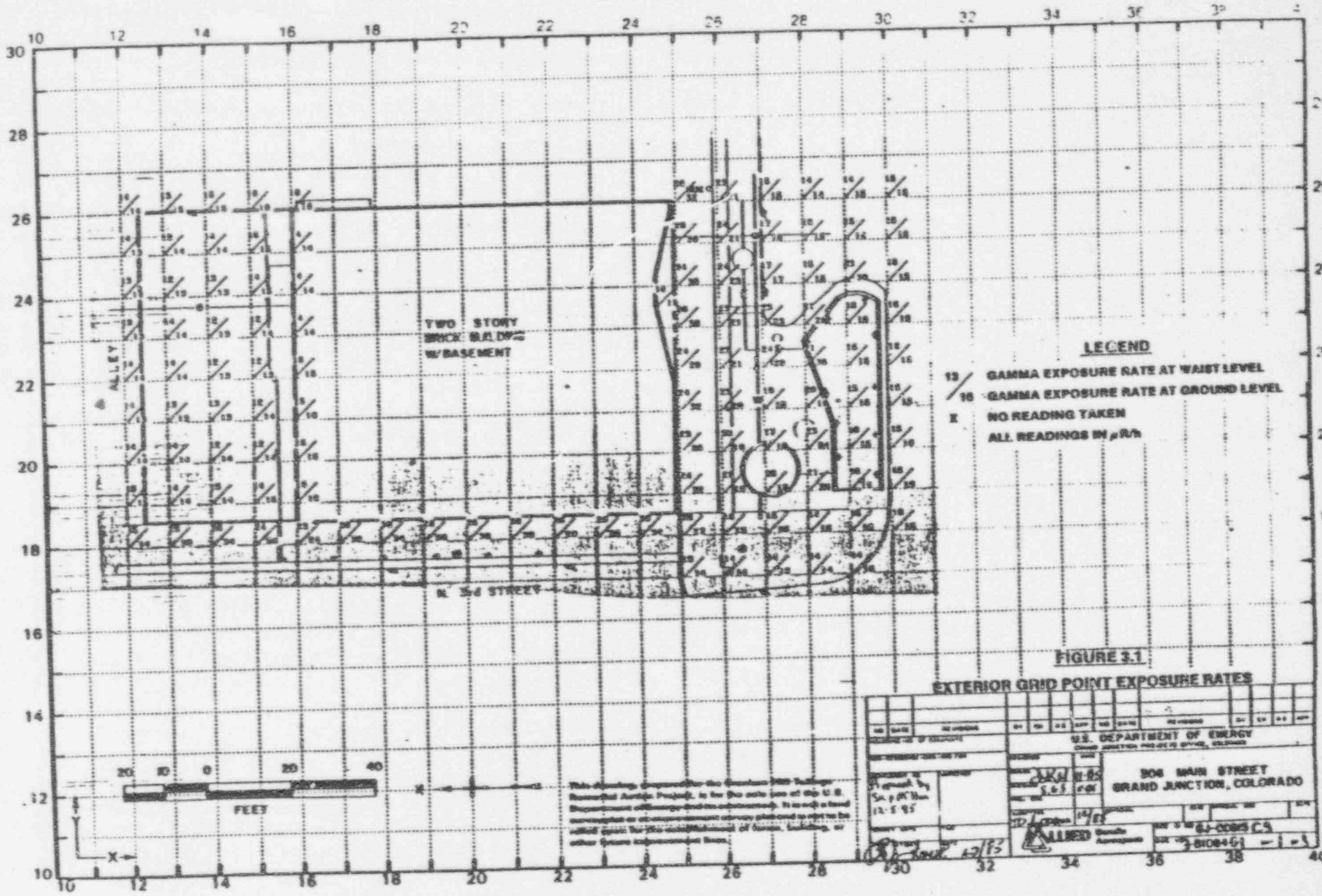


FIGURE 3.1

EXTERIOR GRID POINT EXPOSURE RATES

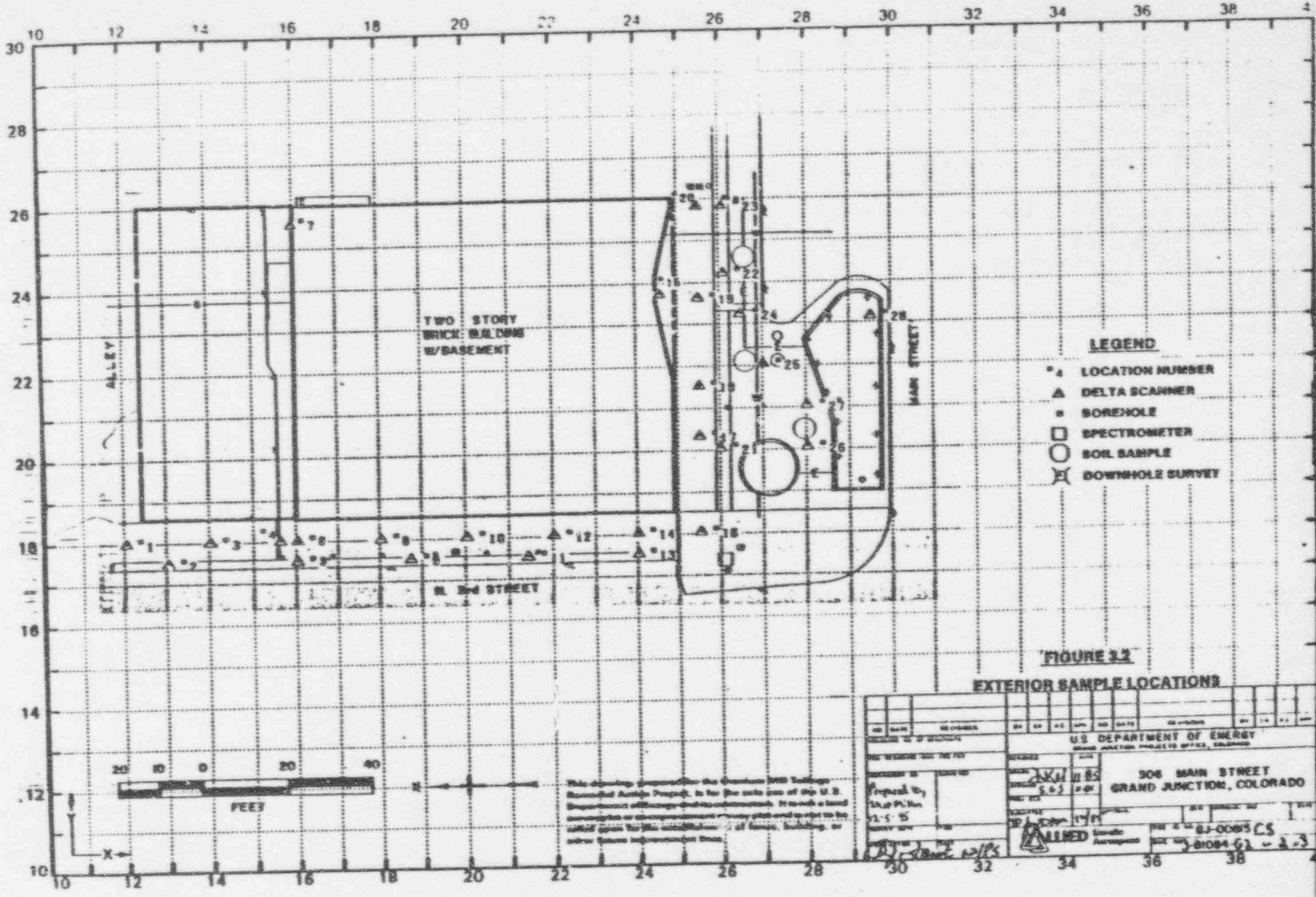
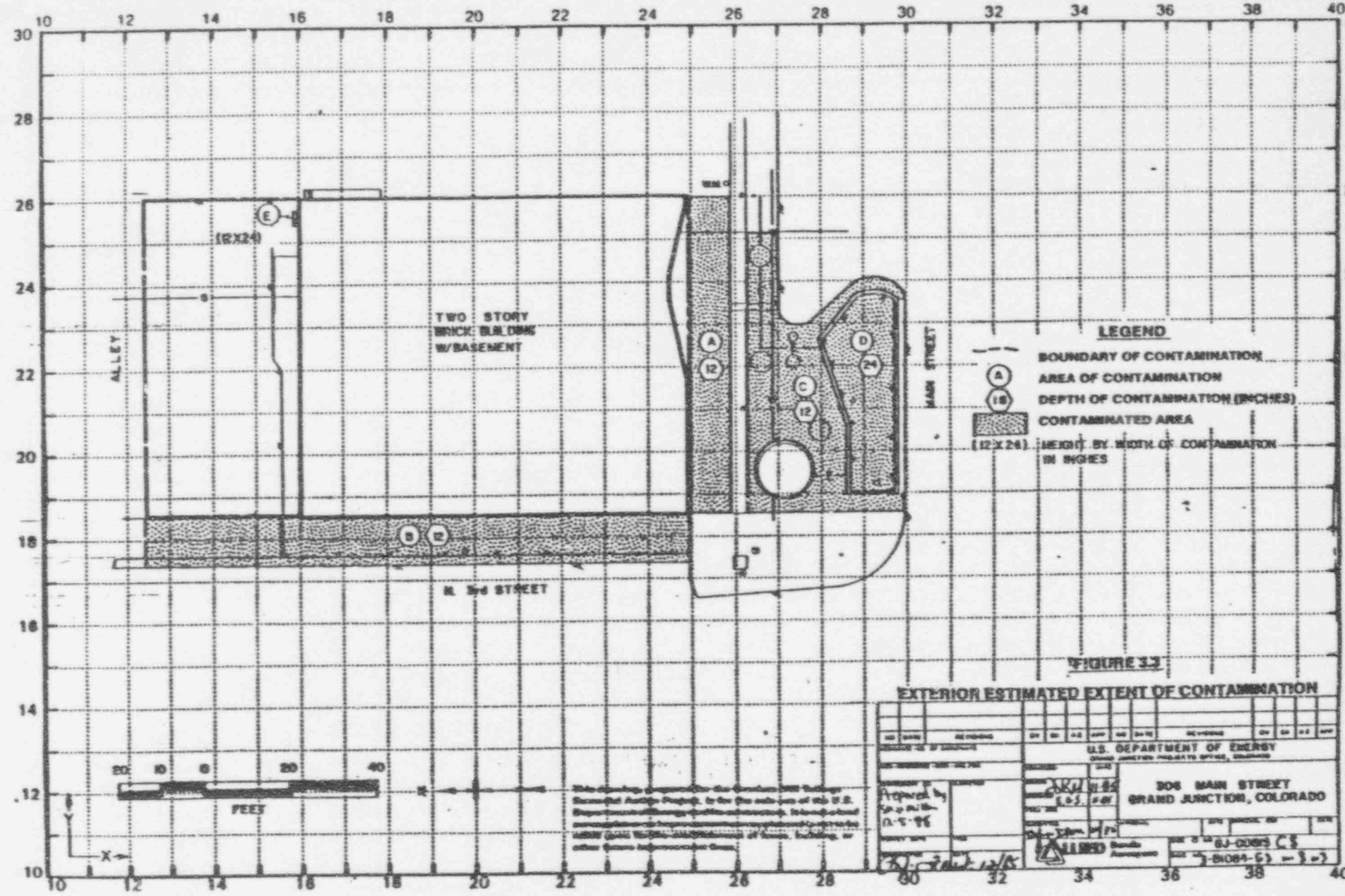
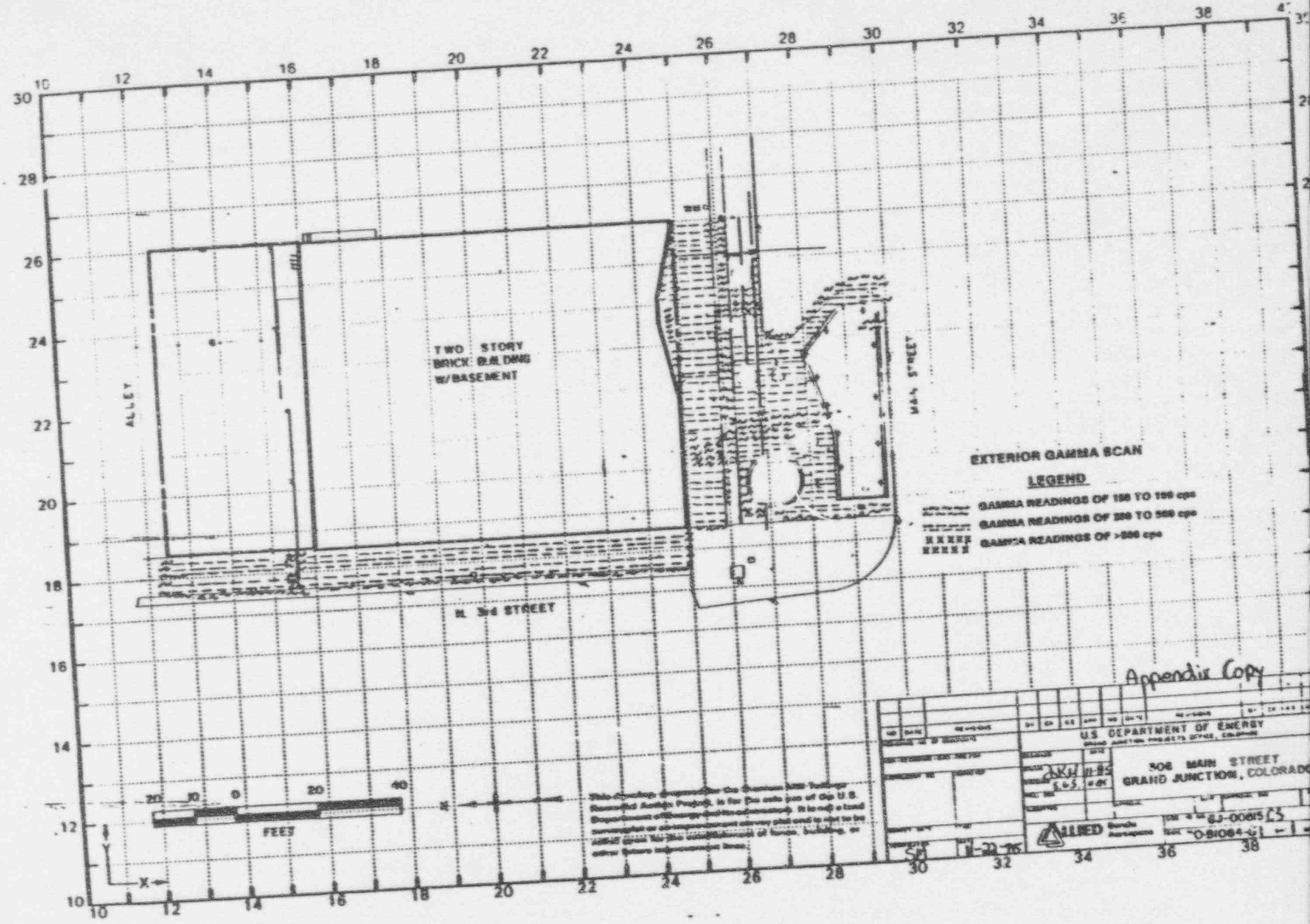


FIGURE 3.2

EXTERIOR SAMPLE LOCATIONS


ALLEY
(8X24)
TWO STORY
BRICK BUILDING
W/BASEMENT
MAIN STREET
N. 3rd STREET
A 12
B 12
C 12
D 24
E
LEGEND
BOUNDARY OF CONTAMINATION
AREA OF CONTAMINATION
DEPTH OF CONTAMINATION (INCHES)
CONTAMINATED AREA
(12 X 24) HEIGHT BY WIDTH OF CONTAMINATION IN INCHES
20 10 0 20 40
FEET
Y
X
FIGURE 3.2
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION
U.S. DEPARTMENT OF ENERGY
205 MAIN STREET
GRAND JUNCTION, COLORADO



Appendix Copy

APPENDIX A

RADIOLOGICAL ASSESSMENT FOR DOE ID No. GJ-00817-CS

CONTENTS

EXECUTIVE SUMMARY

1.0 INTRODUCTION

This property is a commercial structure located at 314 Main Street.

Data were collected using procedures described in the *Field Assessment Operations Technical Data Procedures Manual*. Data collected on this property were assessed to estimate the location of residual radioactive material in excess of the Environmental Protection Agency (EPA) 'Standards for Remedial Action at Inactive Uranium Processing Sites' (40 CFR 192).

This property has been included for remedial action consideration by UNC on the basis of spillover contamination contiguous to an included area on the adjoining property.

2.0 GAMMA EXPOSURE-RATE SURVEYS

2.1 Exterior

Area background is 16 uR/h and 1.7 pCi/g. Gamma exposure rates range from 15 to 42 uR/h. Exterior gamma exposure-rate survey results are shown in Figure 1.

2.2 Interior

Area background determined by UNC is 16 uR/h. Gamma exposure rates in the habitable area range from 15 to 17 uR/h, and there is no area exceeding the EPA standard.

3.0 RADON/RADON DECAY PRODUCT CONCENTRATION (RDC)

No RDC measurements were taken by UNC or CDH.

4.0 EXTENT OF CONTAMINATION

4.1 Exterior

Accumulated data indicate spillover contamination onto the property or properties adjoining the east and west sides of this property. The DOE ID numbers of the spillover properties are GJ-00819 and GJ-00815.

Figure 2 shows the location and types of explorations and radium measurements made, and related radium data are listed in Table 1. Estimated radium concentrations range from 2.4 to 23.3 pCi/g in the contaminated areas.

Figure 3 shows the estimated boundaries and depths of exterior contamination. The deposits containing identified residual radioactive materials are characterized as follows:

In the concrete aggregate of and/or beneath the sidewalks.

In bare soil areas.

4.2 Interior

There is no evidence of interior residual radioactive material at this property.

5.0 REMEDIAL ACTION RECOMMENDATIONS

5.1 Exterior

Exterior Deposits A and B (Figure 3) should be removed and the appropriate cover material replaced.

5.2 Interior

None.

TEAM LEADER NOTES

DOE ID NUMBER: GJ-00817-CS

SURVEY DATE: October 19, 1987

TEAM LEADER: T.R. Unrein

ASSESSMENT TECHNICIAN: T. R. Unrein

The sewer line could not be located. The water line was not investigated, because of the concrete surface covering. The data collected indicate the deposit associated with the gas line is superficial and did not involve the line or trench.

The foundation of the building was not investigated because the building was built in 1911 and the adjacent contamination is superficial.

Contamination of the city sidewalks is associated with the concrete aggregate and underlies the concrete. The thickness of the concrete was not determined.

Contamination from this property spills over to the west and east. The DOE ID numbers of the spillover properties are GJ-00815 at 306 Main Street and GJ-00819 at 316 Main Street.

This property is a spillover inclusion from the property to the west, DOE ID Number GJ-00815, at 306 Main Street.

There were two no-access areas on the property, the garage and basement. The rooms were locked and no keys were available.

A point source of radioactive ore was found. It was not removed at the owner's request.

TRU:bgs

RADRPT V6.1 <870820.0934> Table 1

Radium Concentrations at Exterior Locations

DOE ID #GJ-00817-CS 314 Main Street

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g) Non-Deconv.	Ra-226 (pCi/g) Deconv.	Working Level	Comments
1	140180	00	DS	1.1			Background
2	140190	00	DS	2.0			Background
3	140200	00	DS	1.5			Background
4	140205	00	DS	2.1			Dirt
		[06]	DS	2.0			Hz/On brick
5	150180	00	DS	2.0			Background
6	160180	00	DS	1.9			Background
7	170190	00	DS	2.8			Dirt
		06	DS	2.4			Dirt & Gravel
8	180200	00	DS	7.1			Dirt
		06	DS	2.4			
9	198193	00	DS	1.9			Concrete
		00	DS	2.5			Dirt
		06	DS	1.3			
		06	DS	2.4			Hz/Under 3" concrete
10	262193	00	DS	1.4			Concrete entry
		00	DS	22.6			City sidewalk
11	270200	00	DS	23.3			Concrete
12	280180	00	DS	3.8			Concrete
13	280200	00	DS	2.4			Concrete

Measurement Types:
RP = Radon Profile
GS = GAD-6 Surface
DS = Delta Scintillometer
TC = Total Count Borehole
SS = Soil Sample
DH = Downhole Survey

Notes:
DC = Depth of Contamination
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 10-19-87
Team Leader = TRU

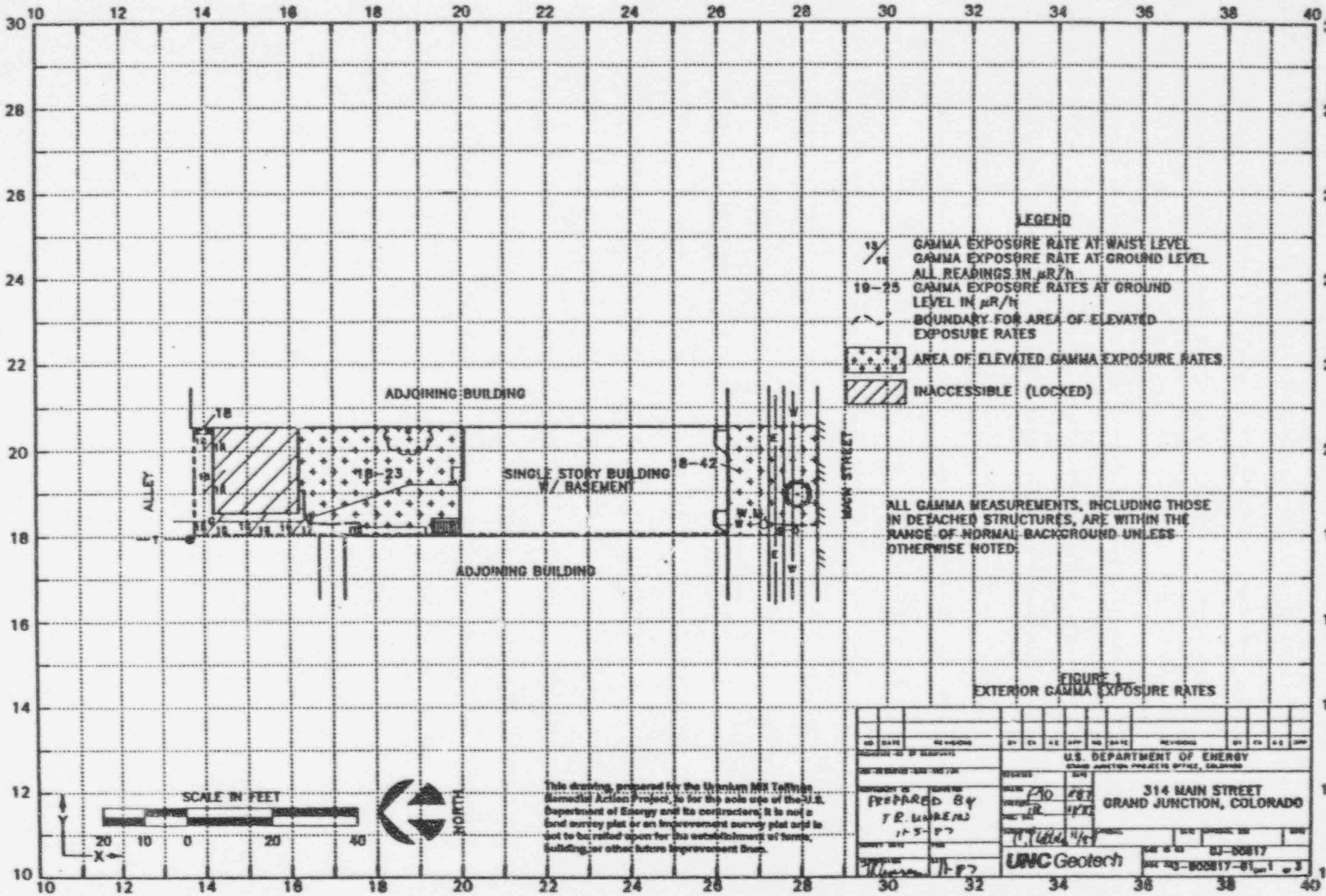


FIGURE 1
EXTERIOR GAMMA EXPOSURE RATES

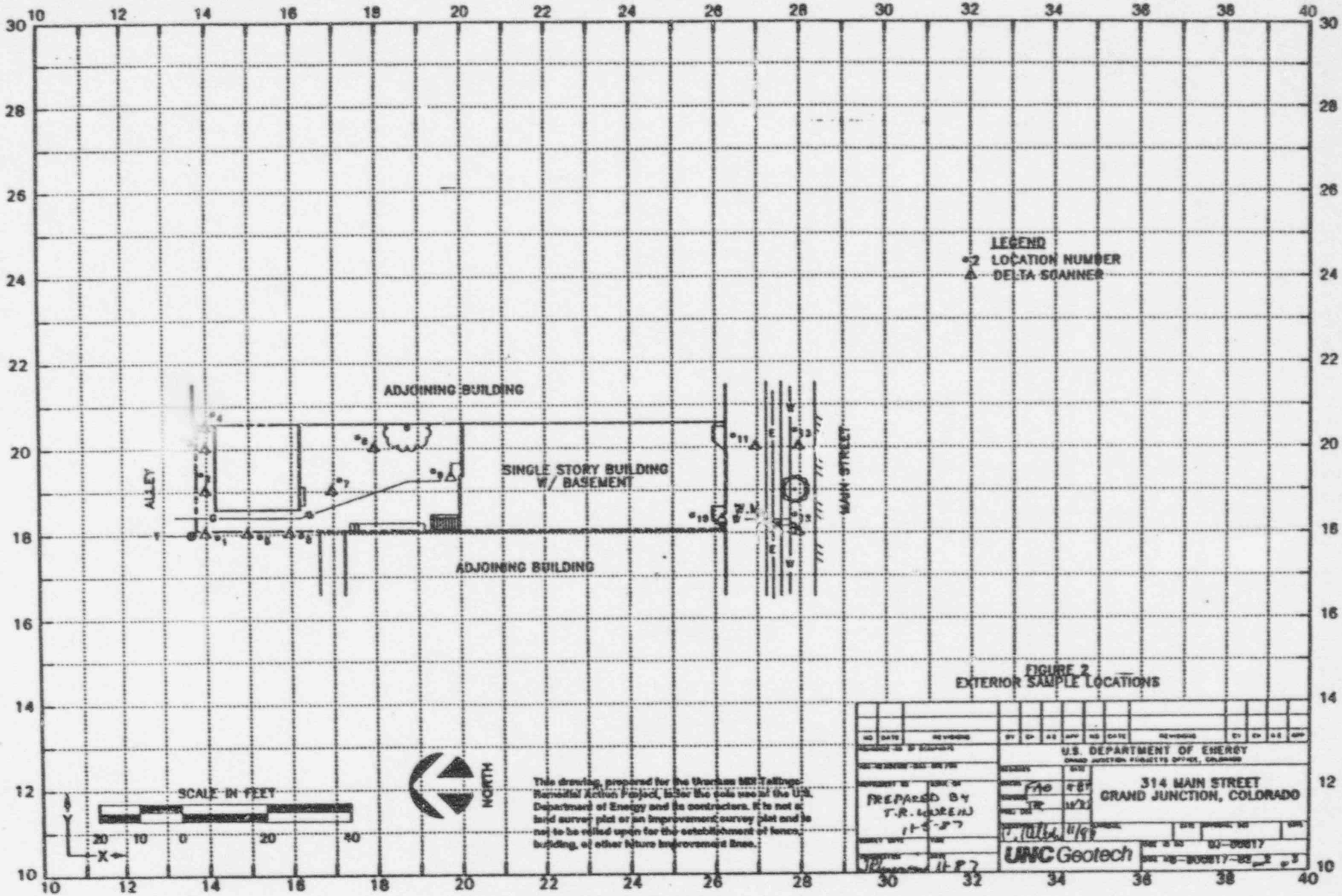


FIGURE 2
EXTERIOR SAMPLE LOCATIONS

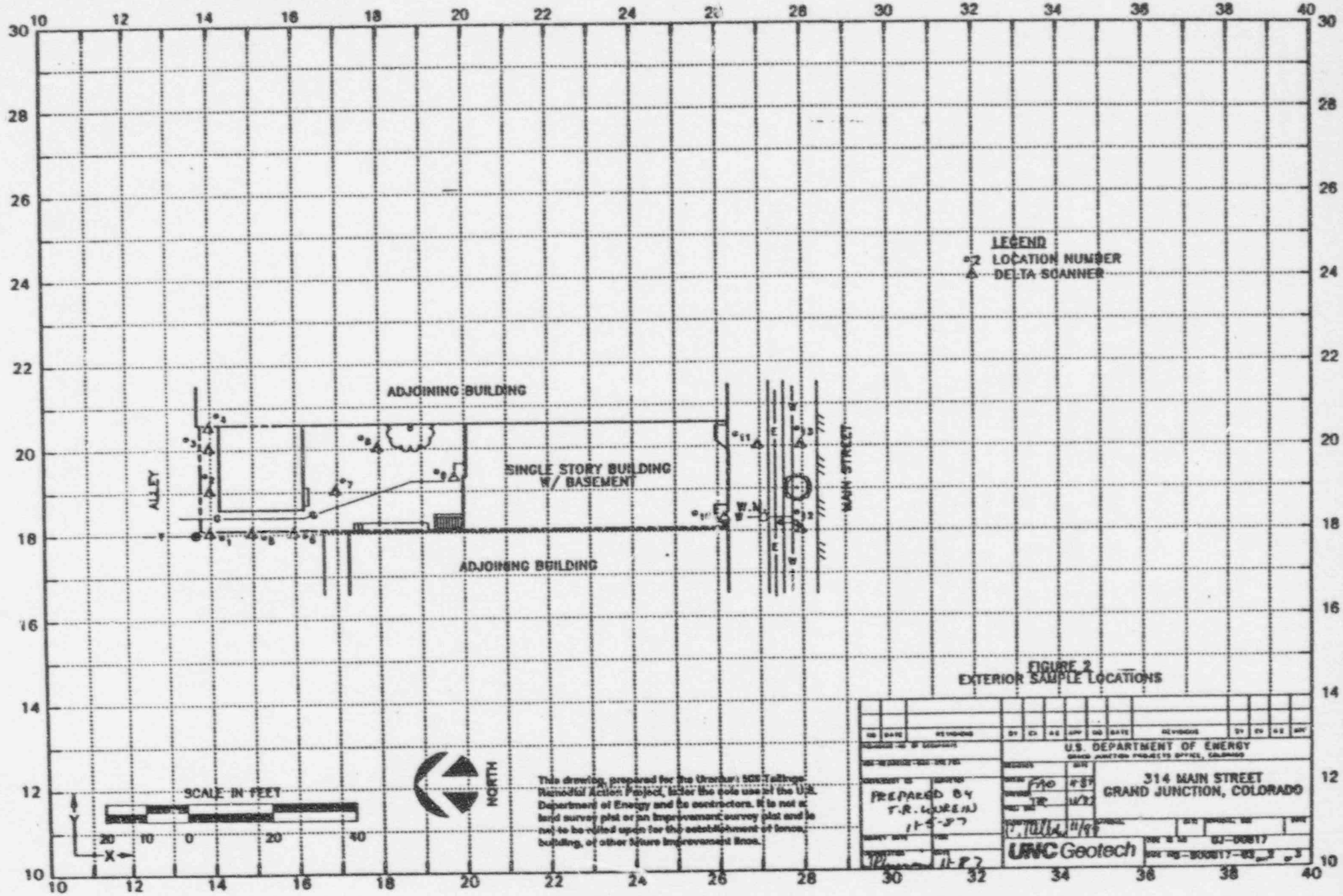


FIGURE 2
EXTERIOR SAMPLE LOCATIONS

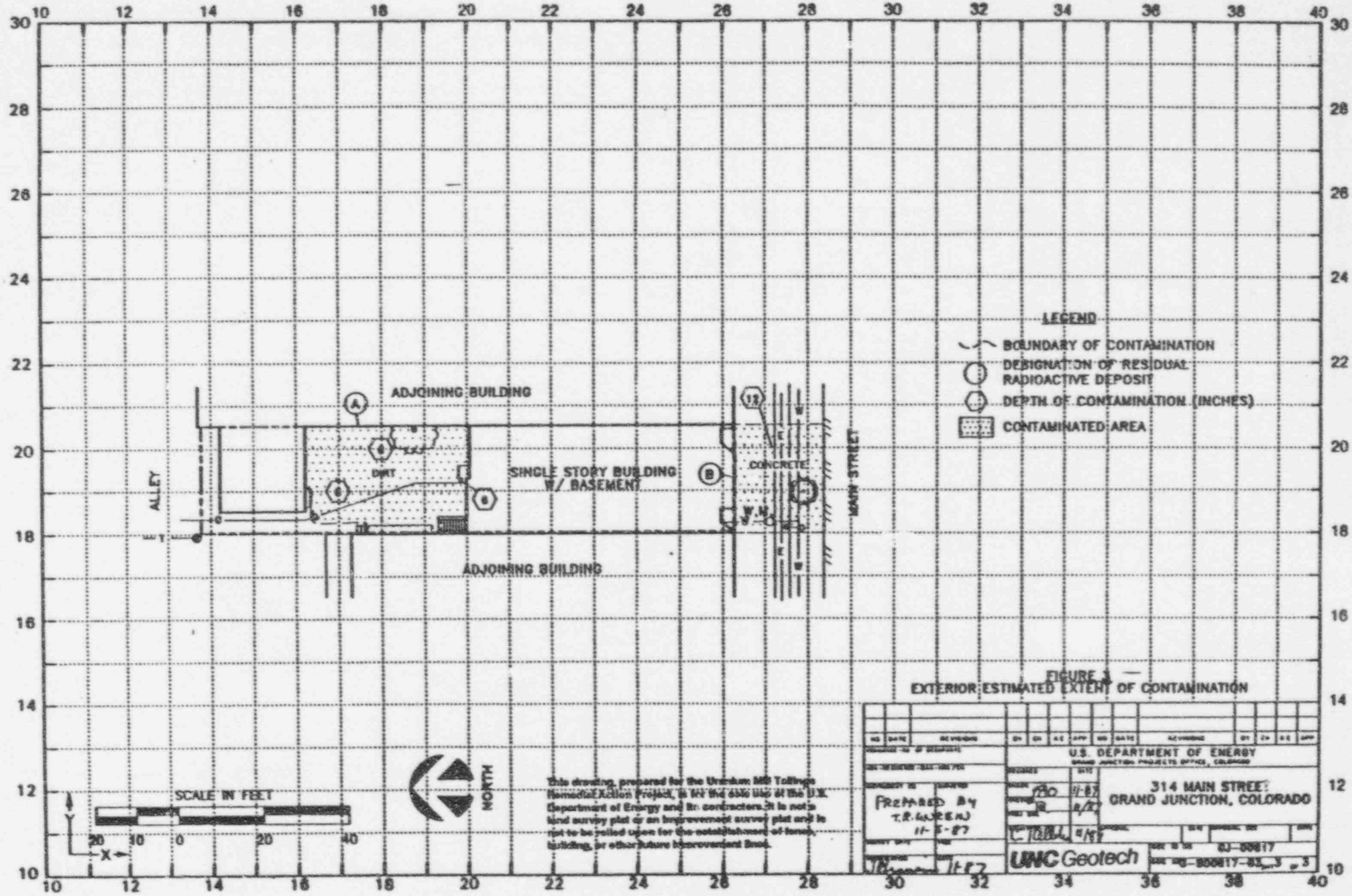


FIGURE 3 —
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

.0 RADIOLOGIC SURVEY

3.1 Introduction

Radiologic assessment data were collected by Bendix at DOE ID No. GJ-00819-CS on September 18, 1986. Data collection methods were performed in accordance with procedures fully described in the Radiologic Support Operations Procedures Manual GJ-07(86) (Bendix Field Engineering Corporation, 1986). These data were evaluated to determine the areal and vertical extent of uranium mill tailings contamination at this property as well as any other contaminated material that may have originated from the millsite. The assessment data collected on this property were analyzed and determined to be in excess of the Environmental Protection Agency (EPA) criteria as set forth in the 'Standards for Remedial Action at Inactive Uranium Processing Sites' (40 CFR 192).

A review of the historical information available for this property was conducted to determine the areas of potential contamination identified during previous radiologic assessments.

3.2 Gamma Exposure-Rate Surveys

3.2.1 Exterior Findings

Area Background: Undetermined
Gamma Exposure Rates Range from: 14 to 31 uR/h

Exterior gamma exposure-rate survey results are shown in Appendix Figure 3.1.

3.2.2 Interior Findings

Area Background: 15 uR/h
Gamma Exposure Rates in Habitable Areas Range from:
15 to 37 uR/h

Interior gamma exposure-rate survey results are shown in Appendix Figure 3.2. Interior gamma exposure-rate measurements are summarized in Appendix Table 3.3.

3.3 Boreholes, Soil Samples, and Other Measurements

No background data was obtained.

Areas which displayed elevated gamma levels were further investigated; the locations and types of these investigations are shown in Appendix Figures 3.3a and 3.3b. Data from these investigations are included in Appendix Tables 3.1 and 3.2.

3.4 Radon/Radon-Daughter Concentration (RDC)

No RDC measurements were taken by Bendix.

3.5 Extent of Contamination

Appendix Figures 3.4a and 3.4b show identified areas and estimated depths of contamination on this property, based on assessments of all measurements taken. As noted in these figures, areas recommended for remedial action that contain identified residual radioactive materials are:

(Area A) In-Situ Ra-226: 39.0 pCi/g
Surface Material: Wood
Location: Interior of structure
Other Directions: East wall
Total Depth of Contamination: Undetermined
Comments: The surface cover is a wooden shelf that rests against a brick wall.
Approximate Square Footage:

(Area B) In-Situ Ra-226: 31.9 pCi/g
Surface Material: Concrete
Location: South of the structure
Total Depth of Contamination: 12 inches
Other (height or thickness): 4-inch-thick concrete
Comments: There is a planter in the area that is contamination free. Utility lines in the area should be checked during remedial action for possible contamination. There are two sections of contamination in this area. Depth of contamination is based on common construction practices.
Approximate Square Footage:

(Areas Requiring Further Investigation During Remedial Action)

The red decorative concrete houses a storm drain that should be monitored during remedial action. Contamination may extend beneath this as well as the sidewalk.

Additional information pertinent to this property is discussed in the Team Leader Notes.

<861015.1525>

Team Leader Notes

Date: September 18, 1986

To: Files

From: Carol Holmes

Subject: Team Leader Notes - GJ-00819-CS

==========

Address: 316 Main Street

Owner: Sally and Floyd Wagner

Owner Address: 351 McFarland Court

Telephone: (303) 243-7906 (Home) (303) 242-3234 (Business)

Tenant: The Linen Shelf Telephone: (303) 242-3234

Year Built: 1901

Team Members: (TL) C. Holmes, J. Roybal, M. Dexter

Instruments: See Operational Equipment Summary sheet

The Colorado Department of Health (CDH) and Oak Ridge National Laboratory (ORNL) data indicates elevated gamma readings associated with the city sidewalk and a point source in the structure against the east wall.

The Bendix survey team gamma scanned the entire property. Elevated readings were found in two sections of the city sidewalk and slightly elevated readings were found against the brick wall in the structure. There are no background readings from this property due to the entire area being surrounded by asphalt or concrete.

Further investigations with delta scintillometer measurements were conducted to establish the areal extents of contamination.

All areas of contamination were located from permanent structural reference points.

An interior gamma survey was performed to characterize the gamma readings within habitable areas of the structure, the range is

115 to 400 counts per second (cps). A point source was located against the east wall at approximately waist level. The reading is present through the wooden shelf which is directly adjacent to the brick wall. This will be called for removal at an undetermined depth.

The footing/foundation was not investigated.

The water, gas, and sewer lines were not located or investigated during the radiologic survey. Health and Safety discouraged augering or coring in this area due to the possibility of hitting an electrical or utility line.

The spillover at this location is the city sidewalk which will not require a spillover inclusion. The property to the west is at 314 Main Street; DOE ID. No. 6J-00817-CS and the property to the east is at 322 Main Street; DOE ID. No. 6J-06034-CS.

The property was returned to pre-survey condition before the Bendix survey team departed.

REVISIT

Date: September 19, 1986

Delta measurements were taken on the point source to determine its presence and location. There appears to be a previous opening the size of a garage door in this location that has since been covered with brick.

RADRPT V4.5 <860630.1052> Table 3.1

Radium Concentrations at Exterior Locations

ID #GJ-00819-CS 316 Main Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In-Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
6	142157	00	DS	21.5		*	Concrete
7	143140	00	DS	14.3		*	Concrete
8	148141	00	DS	1.0		*	Dirt in planter
9	152141	00	DS	20.7		*	Sidewalk
10	153148	00	DS	5.2		*	Decorative concrete
11	153163	00	DS	1.7		*	Entrance
12	162141	00	DS	2.0		*	Concrete
13	163157	00	DS	31.9		*	Sidewalk

surement s:

GB = GAD-6 Borehole
GS = GAD-6 Surface
DS = Delta Scintillometer
TC = Total Count Borehole
SS = Soil Sample
DH = Downhole Scintillometer

Notes:
DC = Depth of Contamination
* = No Soil Sample Taken
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 09-18-86
Team Leader = CH

Loc #	Grid Location	Depth (in.)	Meas. Type	In-Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
1	141220	[48]	DS	1.8		*	On brick wall
2	141280	[36]	DS	<1.0		*	In bathroom
3	170237	[48]	DS	2.3		*	On east wall
4	170243	[48]	DS	39.0		*	On east wall
5	170250	[48]	DS	2.6		*	On east wall

Measurement Types:
GB = GAD-6 Borehole
GS = GAD-6 Surface
DS = Delta Scintillometer
TC = Total Count Borehole
SS = Soil Sample
DH = Downhole Scintillometer

Notes:
DC = Depth of Contamination
* = No Soil Sample Taken
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 09-18-86
Team Leader = CH

pa

Table 3.3
Summary of Interior Gamma Exposure Rates

Location	Number of Readings Taken at Waist Level	Range at Waist Level (uR/h)	Mean at Waist Level (uR/h)	Number of Readings Taken at Surface	Range at Surface (uR/h)	Mean Surface (uR/h)
Ground Floor	05	15-37	21	05	15-18	17

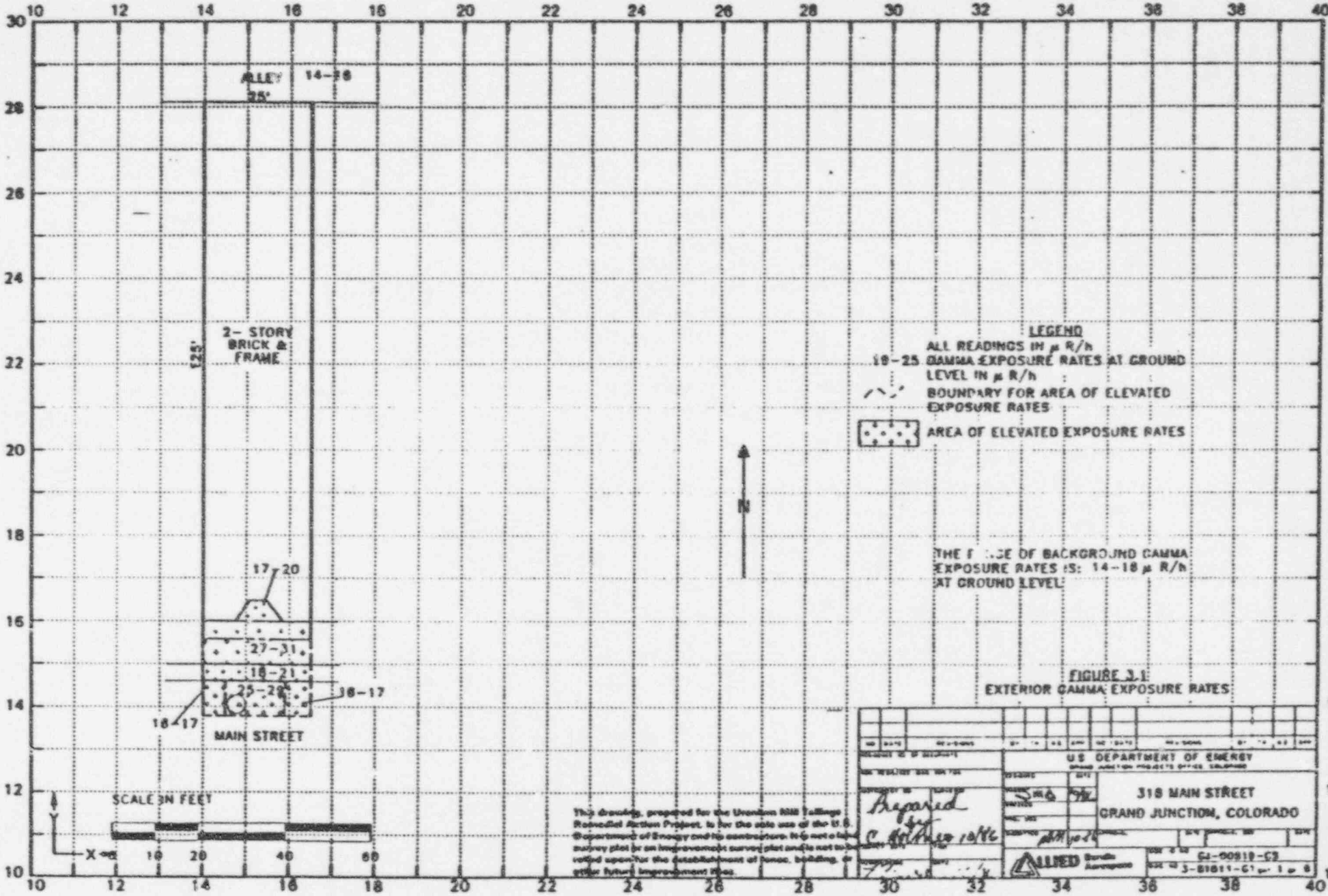


FIGURE 3.1
EXTERIOR GAMMA EXPOSURE RATES

This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plat or an improvements survey plat and is not to be relied upon for the establishment of fence, building, or other future improvement lines.

Prepared by
C. Rothrock 10/86

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION PROJECTS OFFICE, COLORADO

318 MAIN STREET
GRAND JUNCTION, COLORADO

ALLIED Bendix Aerospace

GJ-00818-C2
3-81811-C1

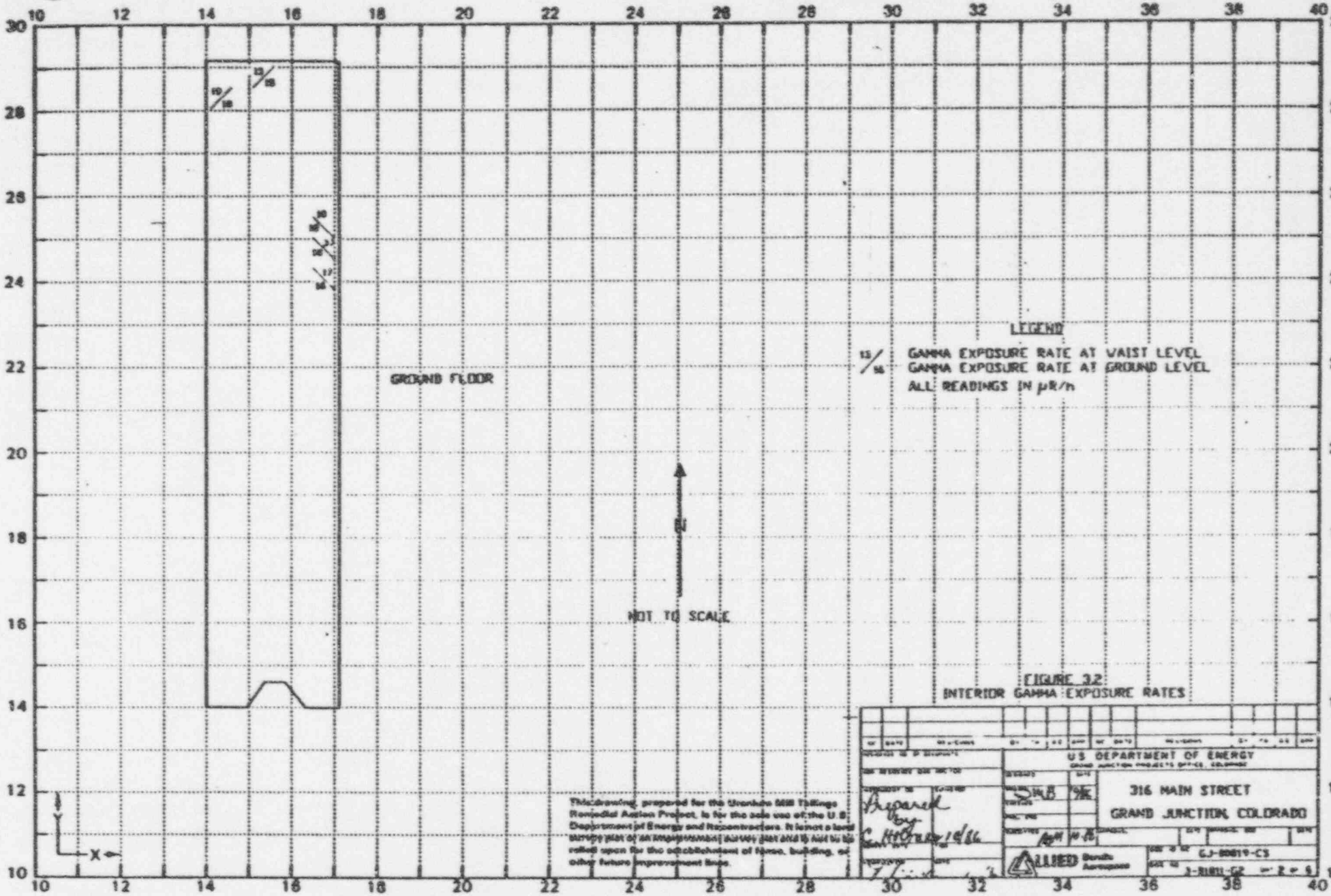


FIGURE 32
INTERIOR GAMMA EXPOSURE RATES

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U.S. DEPARTMENT OF ENERGY

316 MAIN STREET
GRAND JUNCTION, COLORADO

GJ-80819-C3

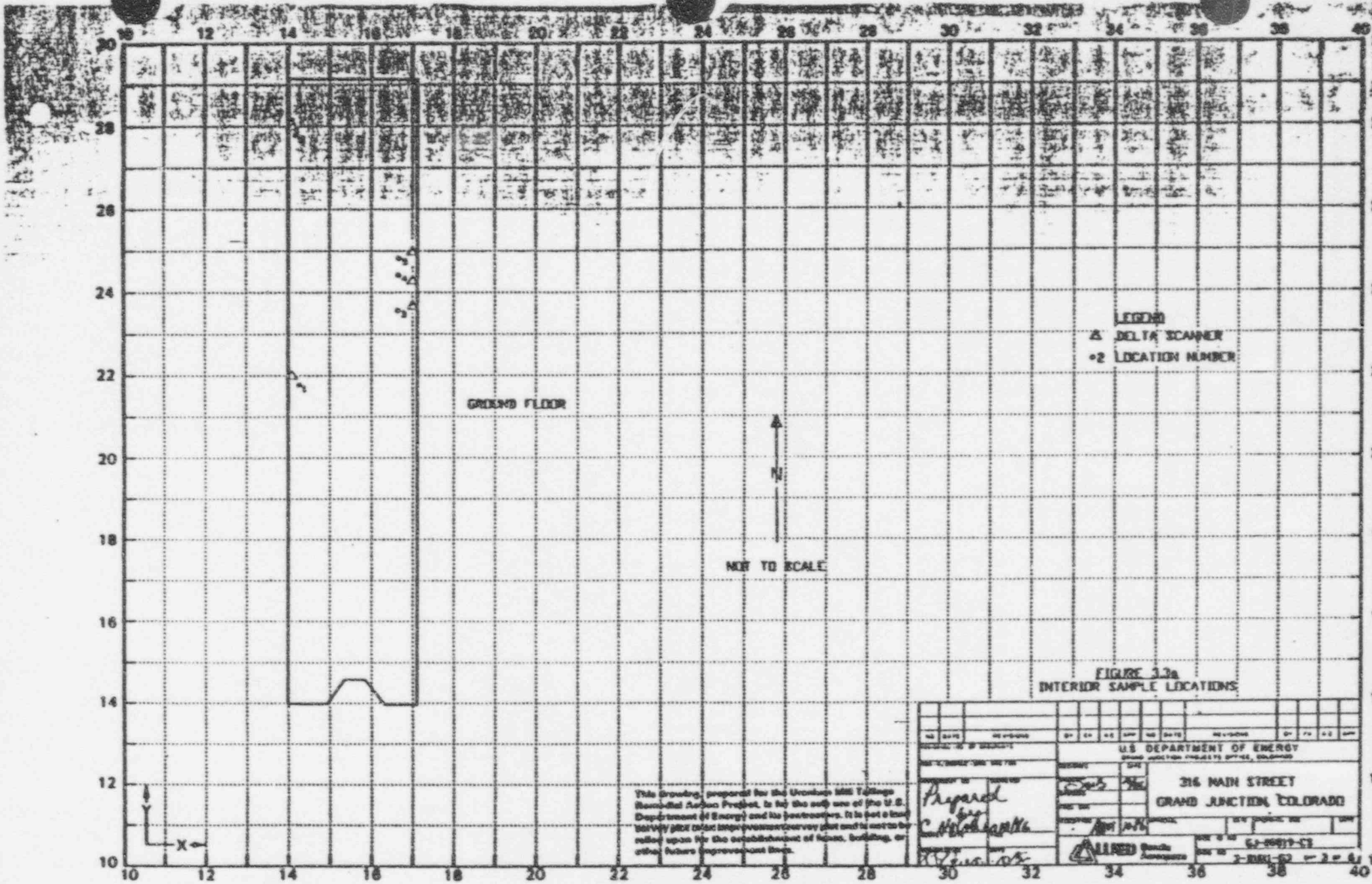


FIGURE 3.3a
INTERIOR SAMPLE LOCATIONS

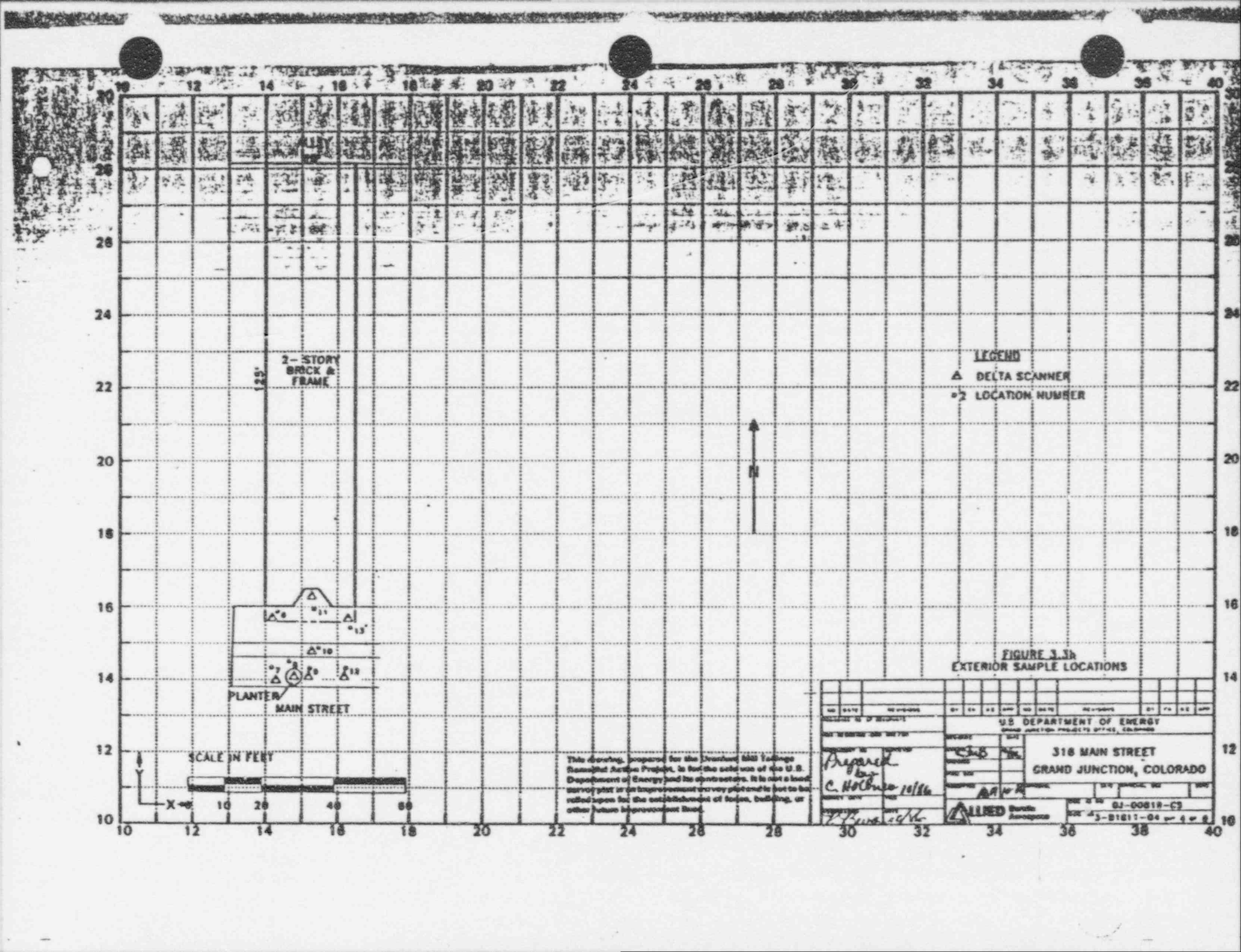


FIGURE 3.3b
EXTERIOR SAMPLE LOCATIONS

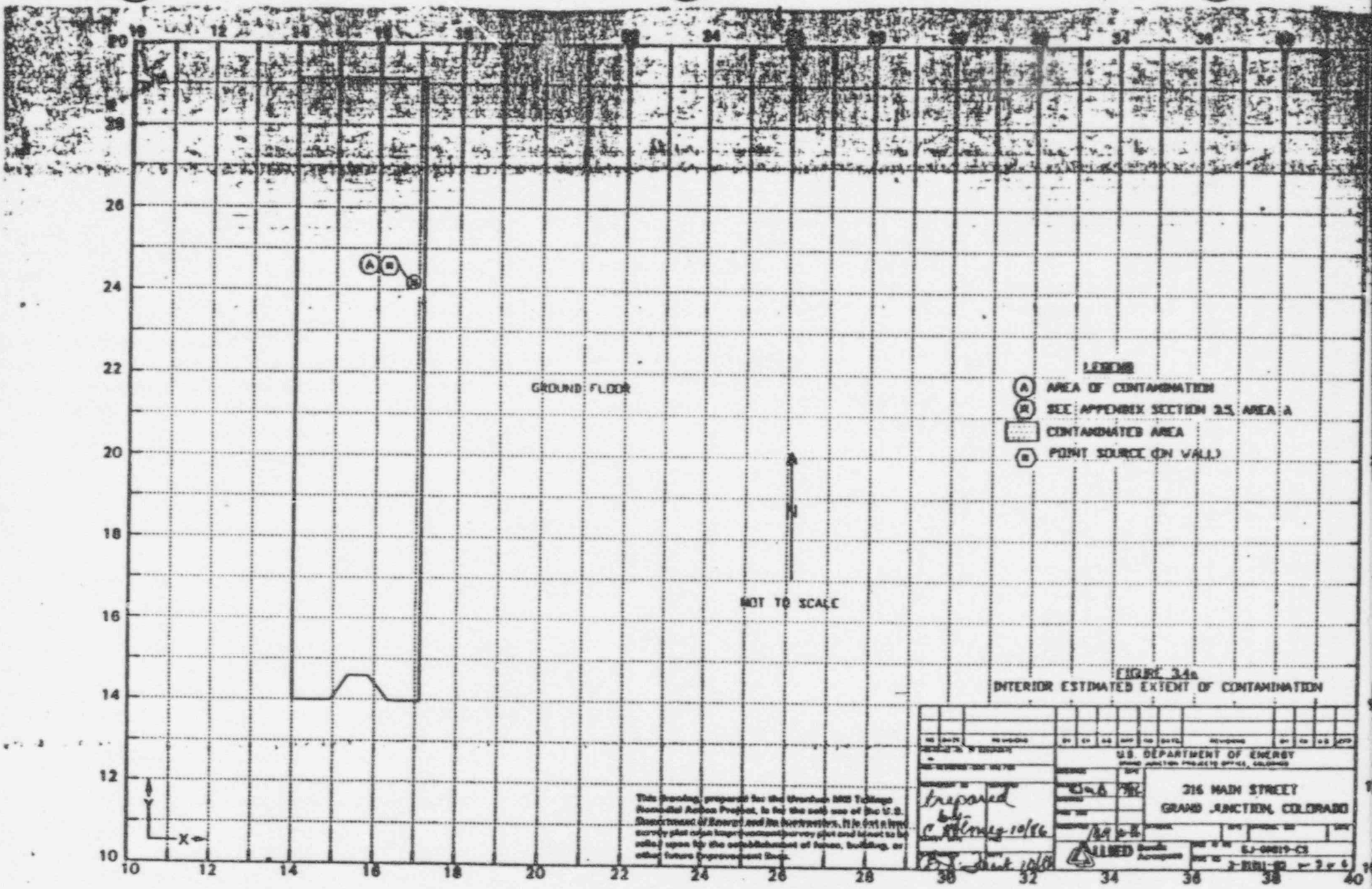


FIGURE 3.4a
INTERIOR ESTIMATED EXTENT OF CONTAMINATION

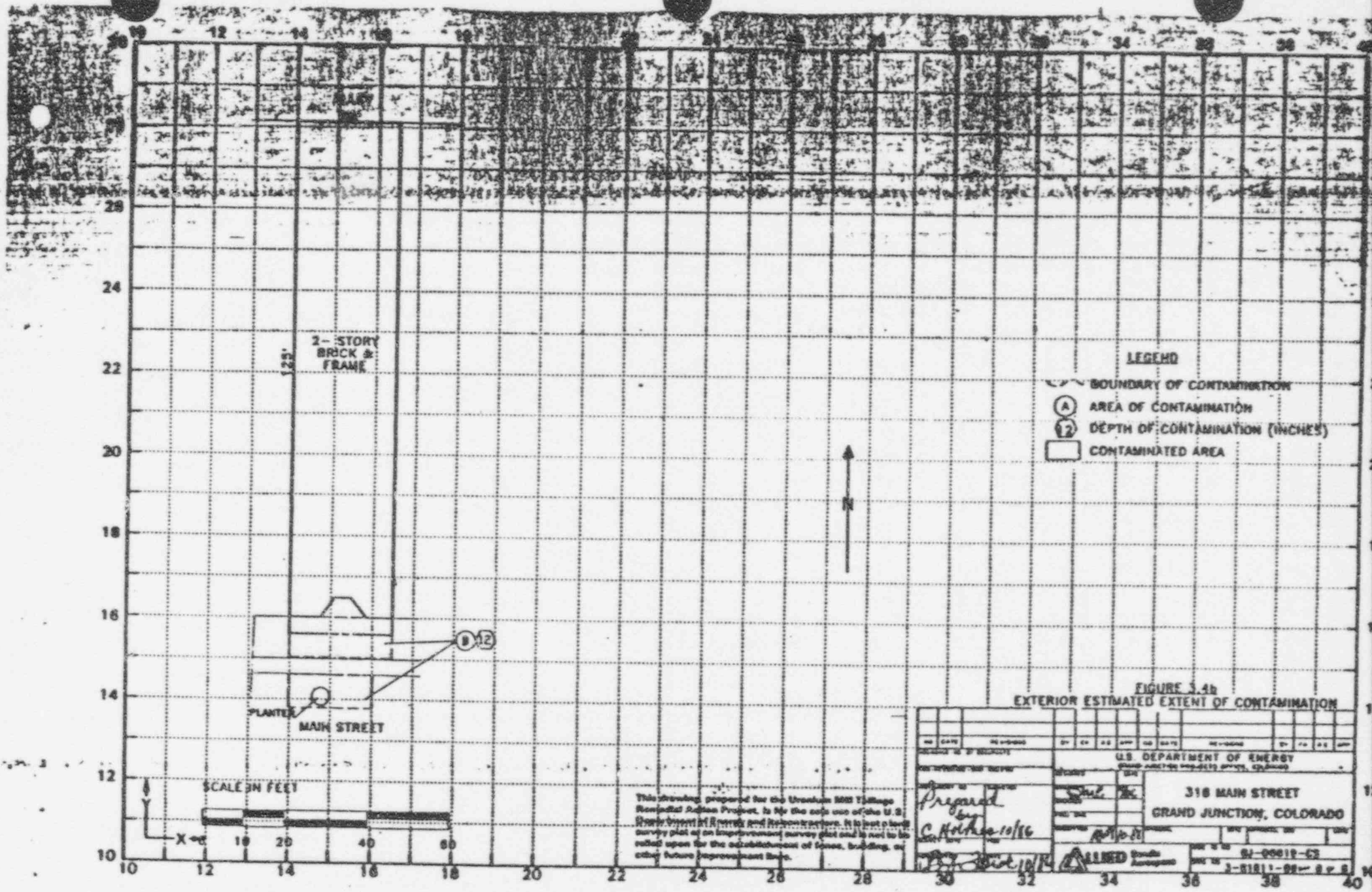


FIGURE 3.4b
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

APPENDIX A

RADIOLOGICAL ASSESSMENT FOR

DOE ID No. GJ-00826-CS
includes GJ-00825 and GJ-06034

CONTENTS

Tables

Figures

EXECUTIVE SUMMARY

1.0 INTRODUCTION

This property is a business located at 326 Main Street.

Following procedures described in the *Field Assessment Operations Technical Data Procedures Manual*, data were collected on this property and assessed to estimate the location of residual radioactive material in excess of the Environmental Protection Agency (EPA) 'Standards for Remedial Action at Inactive Uranium Processing Sites' (40 CFR 192).

This property has been included for remedial action consideration by UNC Geotech on the basis of spillover contamination contiguous to an included deposit on the adjoining property.

2.0 GAMMA EXPOSURE-RATE SURVEYS

2.1 Exterior

The background is undetermined, because of the concrete/asphalt cover over the property.

Gamma exposure rates range from 14 μR/h to 39 μR/h. Exterior gamma exposure-rate survey results are shown in Figure 1.

2.2 Interior

The area background, as determined by UNC Geotech, is 15 μR/h. Gamma exposure rates in the habitable area range from 14 μR/h to 16 μR/h, and there is no area exceeding the EPA standard.

3.0 RADON/RADON DECAY-PRODUCT CONCENTRATION (RDC)

No RDC measurements were taken by UNC Geotech. The gross working level, as determined by CDH in 1975, is 0.009.

4.0 EXTENT OF CONTAMINATION

4.1 Exterior

Accumulated data indicate spillover contamination onto the properties adjoining the west and east sides of this property. The DOE ID numbers of the spillovers are GJ-00819-CS and GJ-00828.

Figure 2 shows the location and types of explorations and radium measurements made; the related radium data are listed in Table 1. Estimated radium concentrations in the contaminated areas range from 16.7 pCi/g to 23.9 pCi/g.

Figure 3 shows the estimated boundaries and depths of exterior contamination. The deposits containing identified residual radioactive materials are characterized as follows:

In the concrete aggregate of or beneath the sidewalks.

4.2 Interior

There is no evidence of interior residual radioactive material at this property.

5.0 REMEDIAL ACTION RECOMMENDATIONS

5.1 Exterior

Exterior Deposits A and B (Figure 3) should be removed and the appropriate cover material replaced.

Removal of spillover contamination on the property or properties adjoining this property on the west and east sides is recommended as part of this remedial action.

5.2 Interior

None.

KAC:pr

TEAM LEADER NOTES

DOE ID NUMBER: GJ-00826-CS includes GJ-00825 and GJ-06034

SURVEY DATE: November 3, 1987

TEAM LEADER: Kent A. Cary

ASSESSMENT TECHNICIAN: Robert Martin

Owner: Richard H. Will Telephone: (303) 243-0754

The deposits located during the UNC survey are comparable to those shown in the historical data.

CDH data indicate an area of elevated readings located in concrete sidewalks at the front of the building.

Owner information indicates that the entire building was rebuilt in 1983. Tailings shown in the CDH historical data were removed at that time.

All utility lines were located.

The utility lines were not investigated, because they underlie areas of concrete and asphalt.

Contamination adjacent to the planter is believed to extend underneath.

Contamination of the concrete sidewalks underlies the concrete. The concrete of the sidewalks is 4 inches thick.

Contamination from this property spills over to the east. The DOE ID number of the spillover property is GJ-00828 at 336 Main Street. This property has been surveyed by UNC.

This property is a spillover inclusion from the property to the west, DOE ID number GJ-00819 at 316 Main Street.

Contamination involving the sidewalk may extend under the red formed concrete, and ceramic tile areas and should be monitored during remedial action.

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g) Non-Deconv.	Ra-226 (pCi/g) Deconv.	Working Level	Comments
1	175132	00	DS	6.4			Red concrete
		00	DS	20.0			Concrete
2	176145	00	DS	2.8			Ceramic tile
		00	DS	23.9			Concrete
3	189148	[06]	DS	<1.0			Hz/On brick
		00	DS	2.8			Ceramic tile
4	200140	00	DS	22.7			Concrete
5	210132	00	DS	7.0			Old concrete
		00	DS	5.1			Red concrete
6	210145	00	DS	6.3			Red tile
		00	DS	16.7			Concrete
7	218147	00	DS	2.6			Ceramic tile

Measurement Types:
RP = Radon Profile
GS = GAD-6 Surface
DS = Delta Scintillometer
TC = Total Count Borehole
SS = Soil Sample
DH = Downhole Survey

Notes:
DC = Depth of Contamination
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 10-30-87
Team Leader = RCM

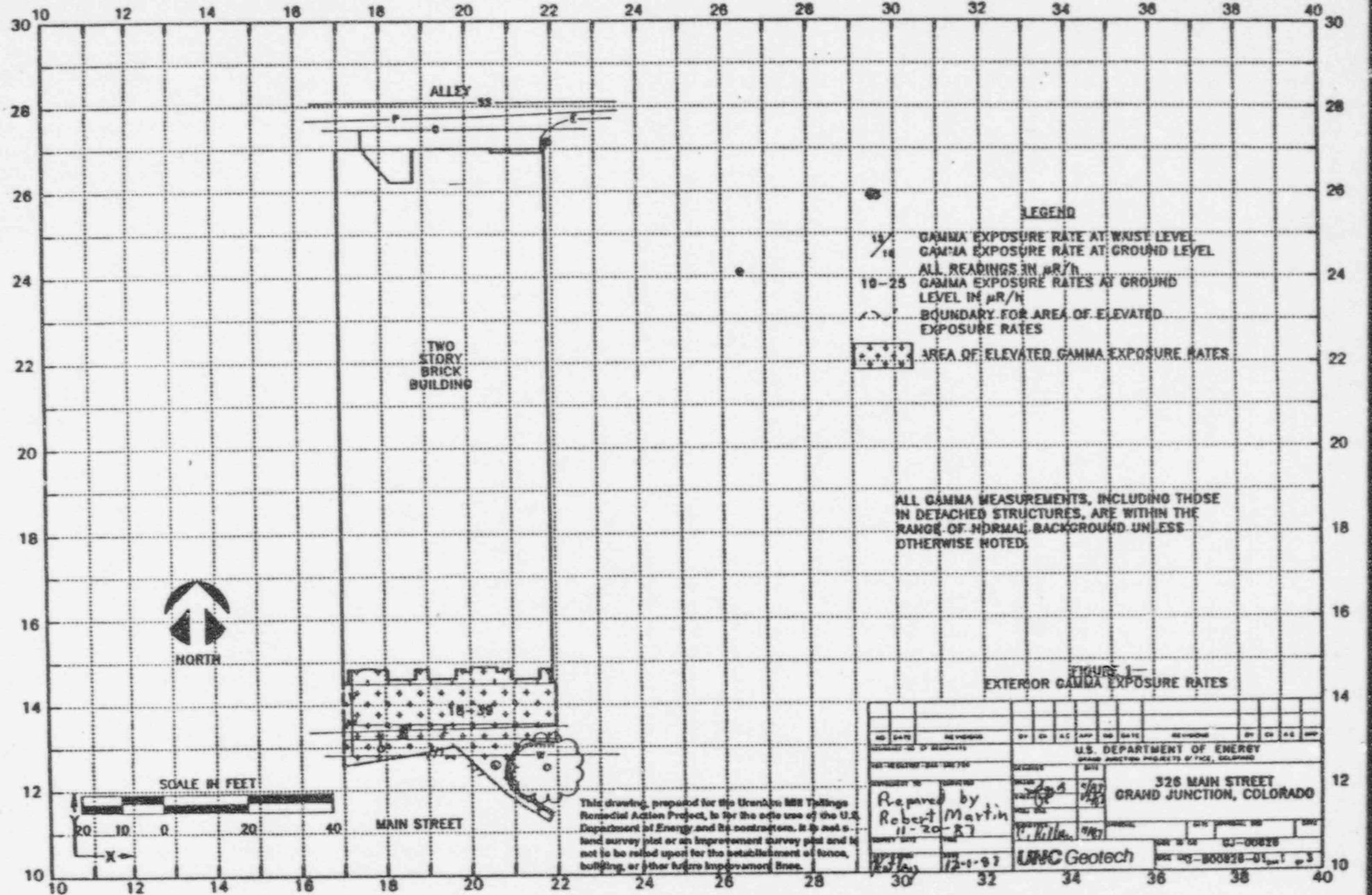


FIGURE 1—
EXTERIOR GAMMA EXPOSURE RATES

This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plat or an improvement survey plat and is not to be relied upon for the establishment of fence, building, or other future improvement lines.

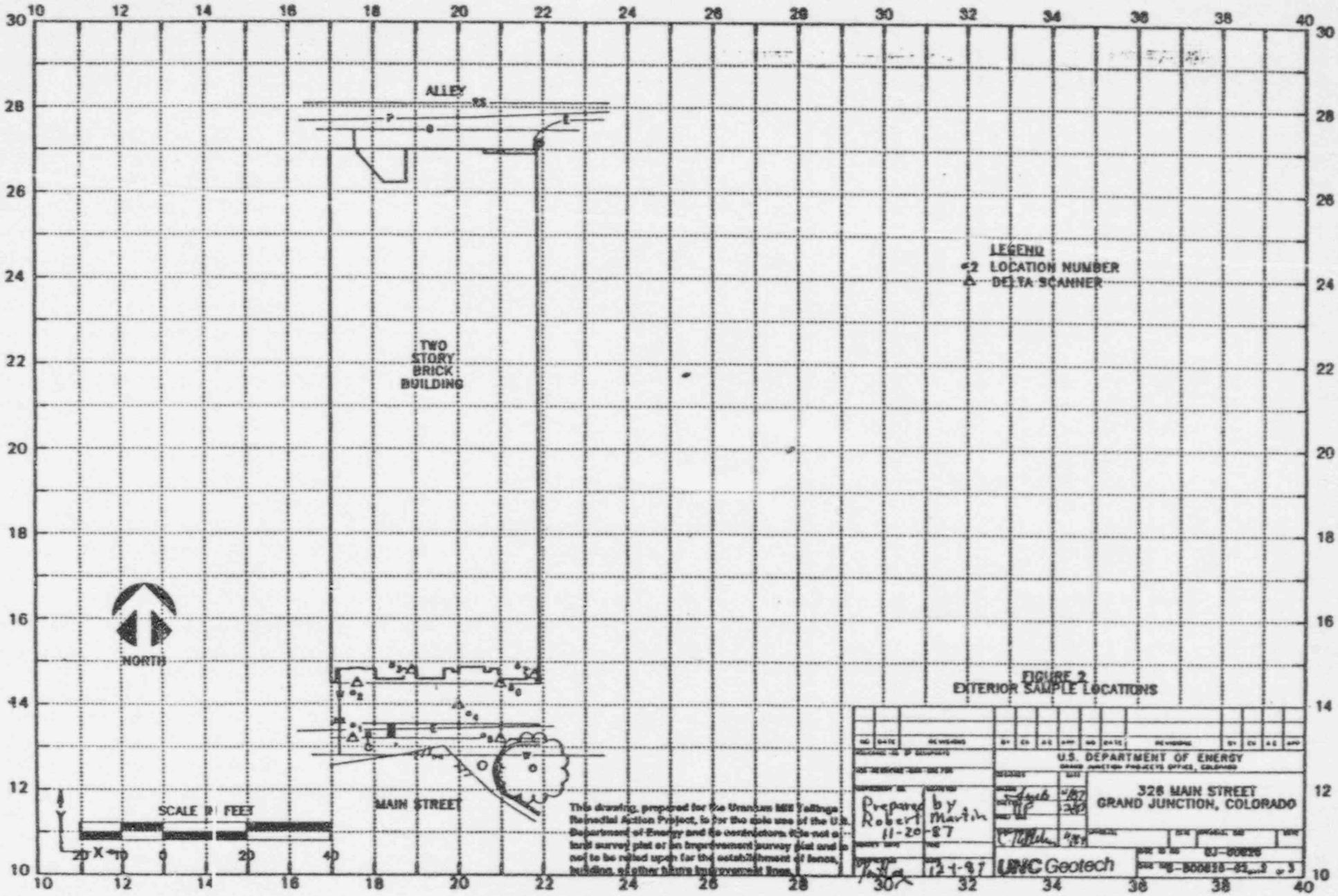


FIGURE 2
EXTERIOR SAMPLE LOCATIONS

This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plat or an improvement survey plat and is not to be relied upon for the establishment of fence, building, or other future improvement lines.

Prepared by Robert Martin 11-20-87	U.S. DEPARTMENT OF ENERGY GRAND JUNCTION PROJECTS OFFICE, COLORADO
12-1-87	328 MAIN STREET GRAND JUNCTION, COLORADO
UNC Geotech	DJ-000828

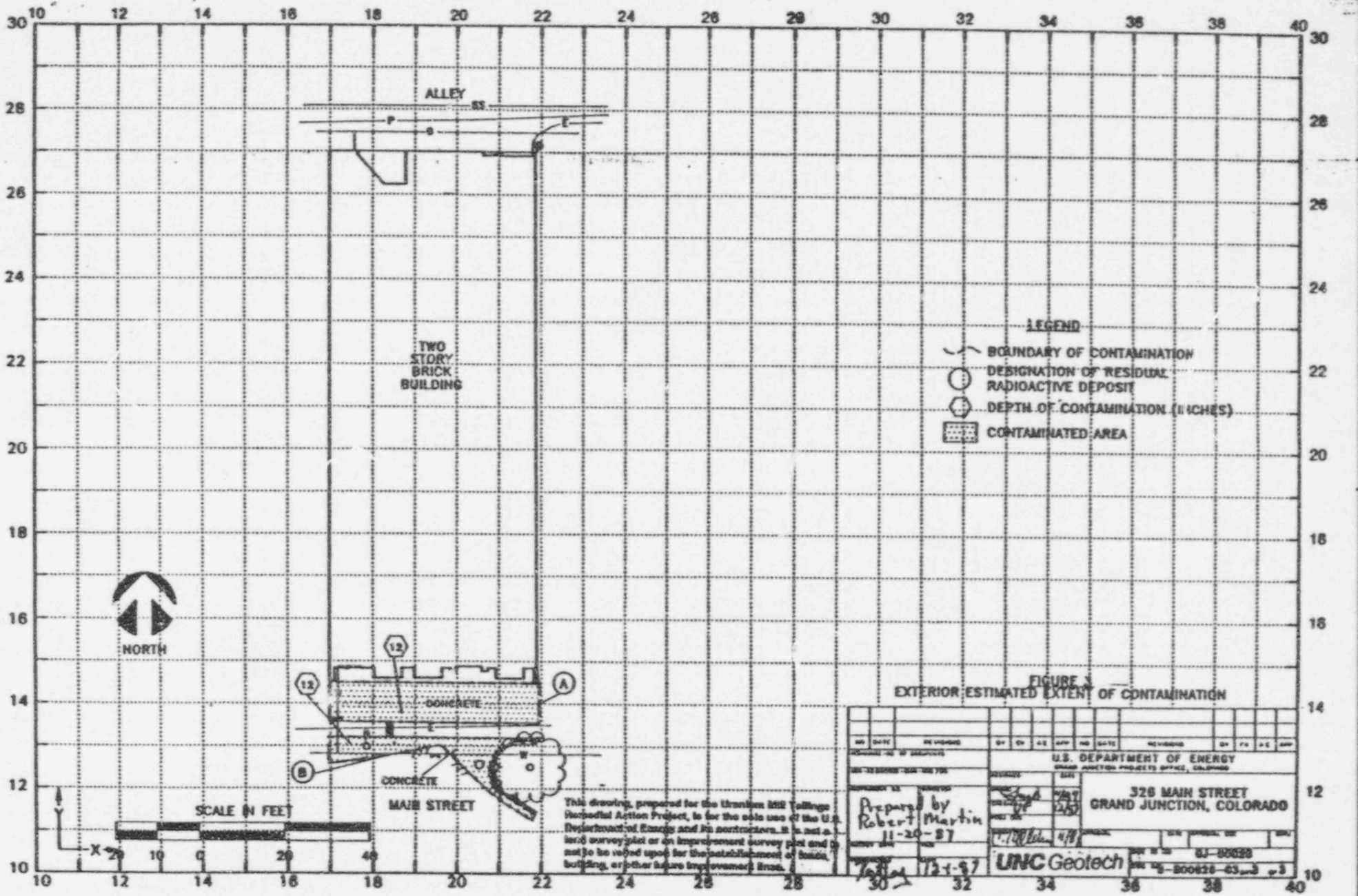


FIGURE 3
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plat or an improvement survey plat and is not to be relied upon for the establishment of fence, building, or other future improvement lines.

Prepared by Robert Martin 11-20-87

12-1-87

U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION PROJECTS OFFICE, COLORADO

326 MAIN STREET
GRAND JUNCTION, COLORADO

UNC Geotech

GJ-000326
S-000326-63

APPENDIX A

RADIOLOGICAL ASSESSMENT FOR DOE ID No. GJ-00828-CS

CONTENTS

EXECUTIVE SUMMARY

1.0 INTRODUCTION

This property is a commercial structure, located at 336 Main Street.

Data were collected using procedures described in the Field Assessment Operations Technical Data Procedures Manual. Data collected on this property were assessed to estimate the location of residual radioactive material in excess of the Environmental Protection Agency (EPA) 'Standards for Remedial Action at Inactive Uranium Processing Sites' (40 CFR 192).

This property has been included for remedial action consideration by ORNL on the basis of excess radium-226 concentration in land area.

2.0 GAMMA EXPOSURE-RATE SURVEYS

2.1 Exterior

Area background is undetermined due to the surface cover. Gamma exposure rates range from 15 to 42 uR/h. Exterior gamma exposure-rate survey results are shown in Figure 1.

2.2 Interior

Area background determined by UNC is 15 uR/h. Gamma exposure rates in the habitable area range from 14 to 16 uR/h, and there is no area exceeding the EPA standard.

3.0 RADON/RADON DECAY PRODUCT CONCENTRATION (RDC)

No RDC measurements were taken by UNC or CDH.

4.0 EXTENT OF CONTAMINATION

4.1 Exterior

Accumulated data indicate spill-over contamination onto the properties adjoining the east and west sides of this property. The DOE ID numbers of the spillovers are GJ-00819 and GJ-00829.

Figure 2 shows the location and types of explorations and radium measurements made, and related radium data are listed in Table 1. Estimated radium concentrations range from 3.6 to 31.7 pCi/g in the contaminated areas.

Figure 3 shows the estimated boundaries and depths of exterior contamination. Deposits containing identified residual radioactive materials are characterized as follows:

In the concrete aggregate of and beneath the sidewalks and beneath the wood deck.

In the brick wall.

4.2 Interior

There is no evidence of interior residual radioactive material at this property.

5.0 REMEDIAL ACTION RECOMMENDATIONS

5.1 Exterior

Referencing Figure 3, exterior Area A should be remediated as follows: Remove the section of this area that lies within 10 feet of the building. Supplemental standards should be applied to the remainder of this area. Area B should be removed, and the appropriate cover material should be replaced. Spillover contamination on the properties adjoining the east and west sides is recommended to be co-constructed as part of this remedial action.

5.2 Interior

None

DOE ID No. GJ-00828-CS

Team Leader Notes

Survey Date: May 5, 1987

Team Leader: P. Wetherstein

DOE ID Number: GJ-00828-CS

Tenant: Main Street Arcade

The UNC survey team found all contamination indicated by ORNL data. In the contaminated sidewalk area on the south side of the property, two small concrete sections were found to be clean, and these are shown on Figure 3. Also, the contaminated concrete extends underneath a wooden deck located in the northwest corner of this sidewalk area. Contamination to be removed in this area was called to the standard construction depth of 12 inches due to the impracticality of drilling investigative holes. This area should be closely monitored during construction in case contamination runs deeper than 12 inches. Spillover exists to the east and west in the contaminated sidewalk areas on DOE ID #GJ-00819 and #GJ-00829. These properties have been included by ORNL.

In addition to ORNL findings, two contaminated brick sections were located on the exterior north walls of the property building. A sketch showing the dimensions of these sections is included with these notes. The contaminated brick at Location 135240 appears to extend to the top of the brick wall.

Elevated gamma readings along the asphalt in the alley on the north side of the property are the result of shine associated with the brick exterior walls in the alley.

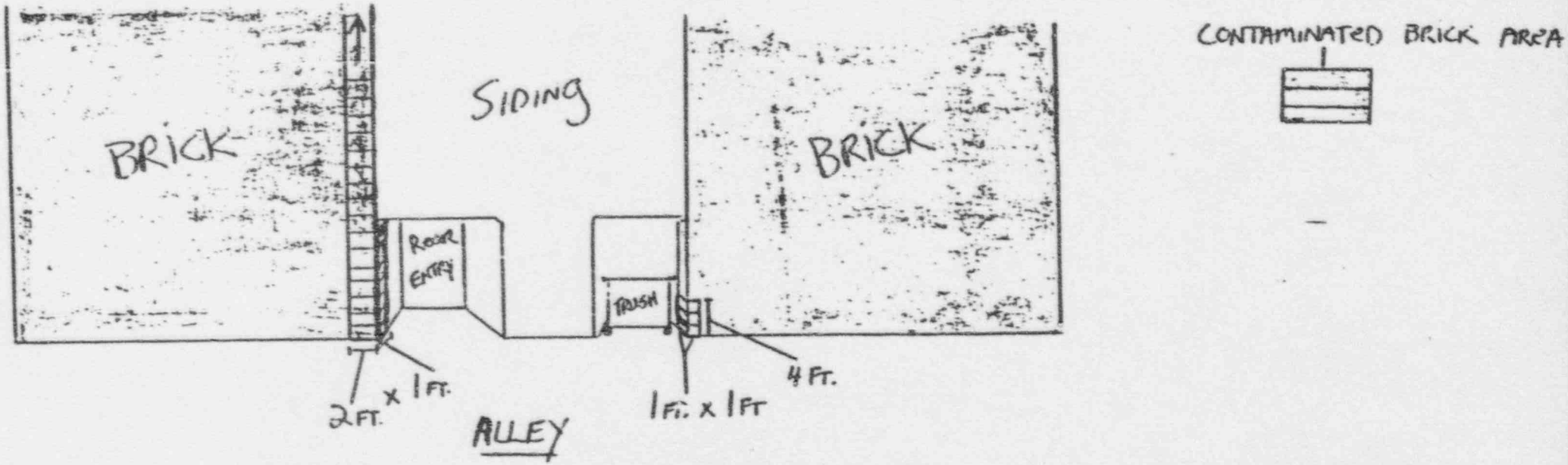
Utility lines were located but not investigated. No foundations were investigated.

GJ-C 8-CS

336 MAIN STREET

EXTERIOR

NORTH FACE OF BUILDING



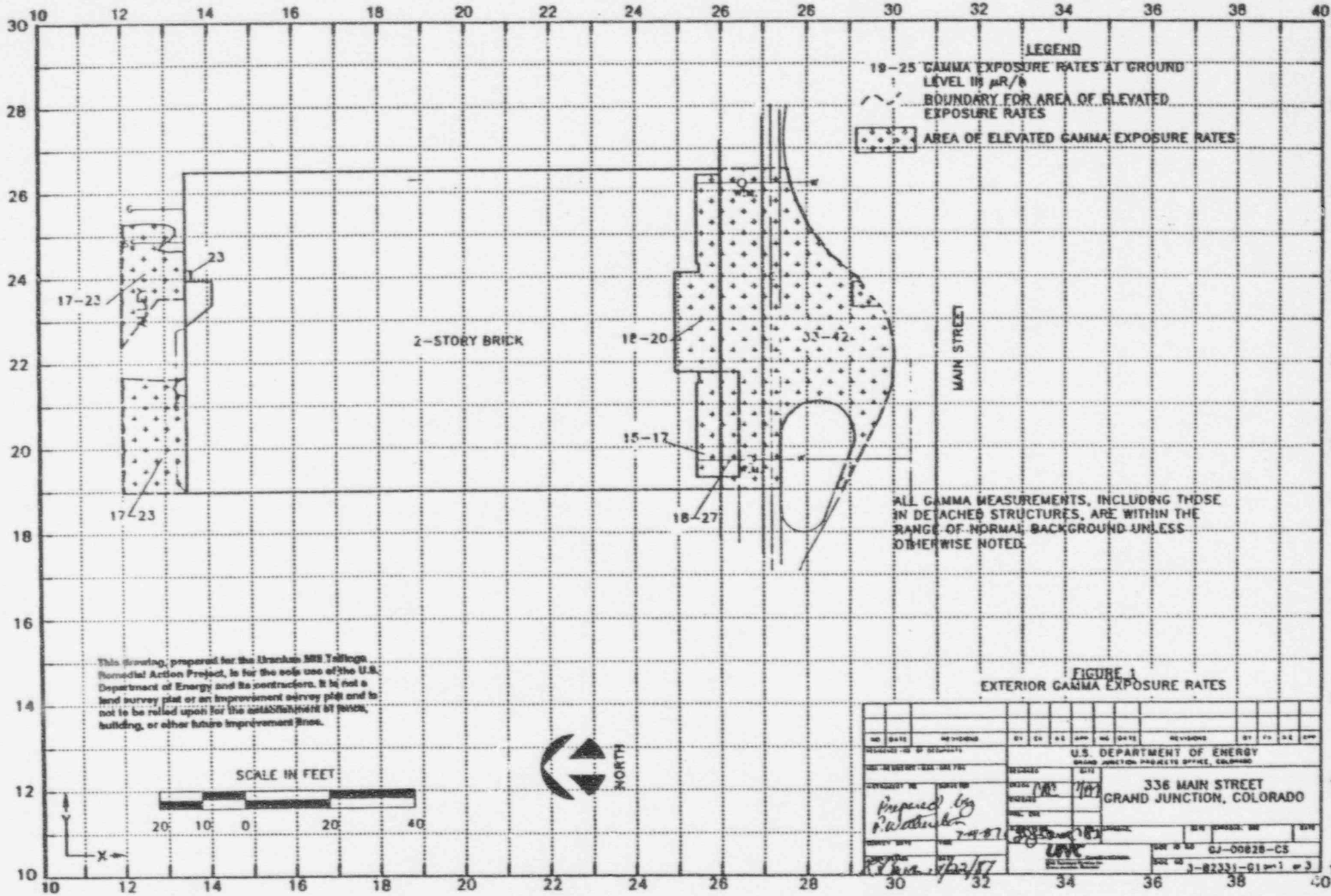


FIGURE 1
EXTERIOR GAMMA EXPOSURE RATES

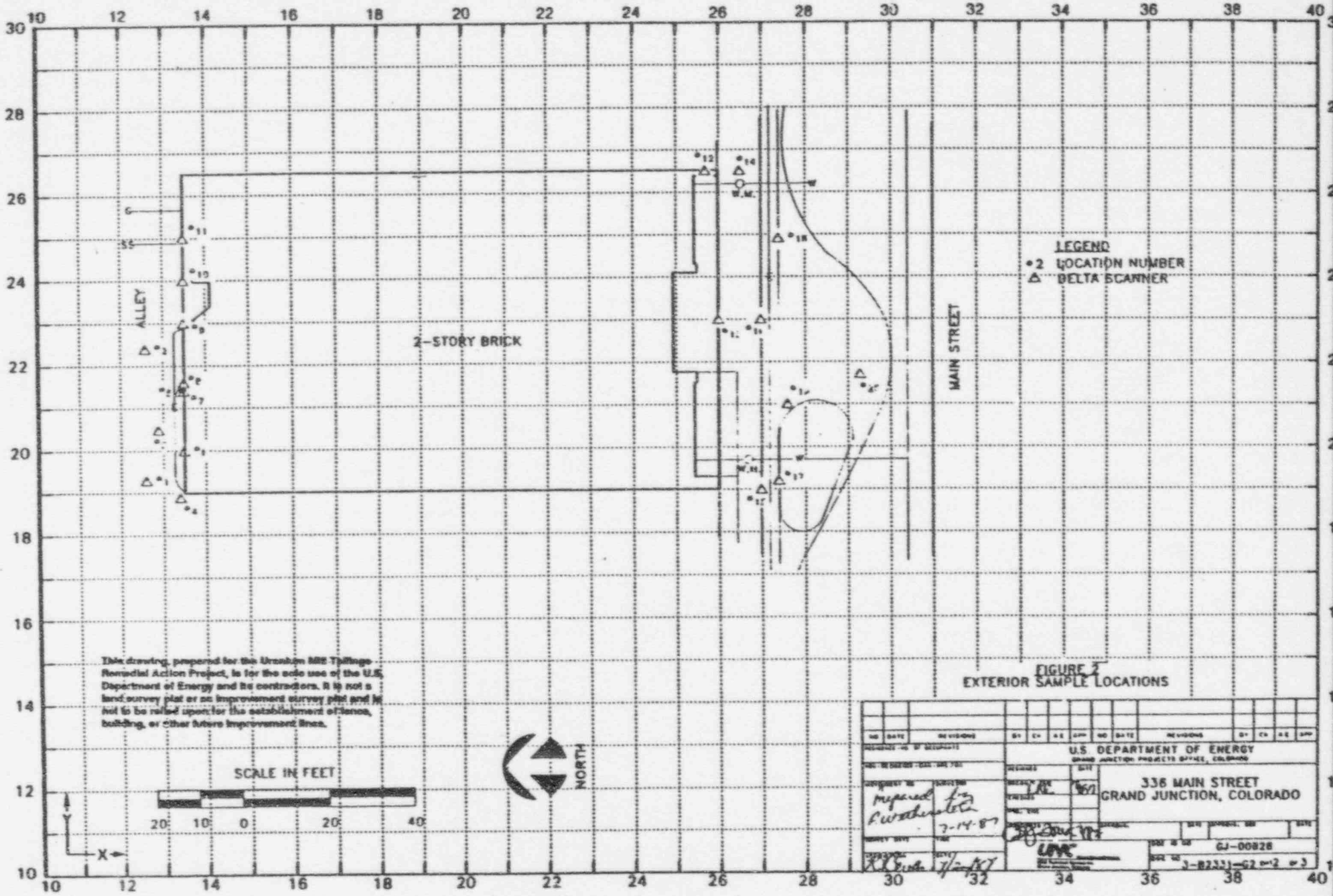


FIGURE 2
EXTERIOR SAMPLE LOCATIONS

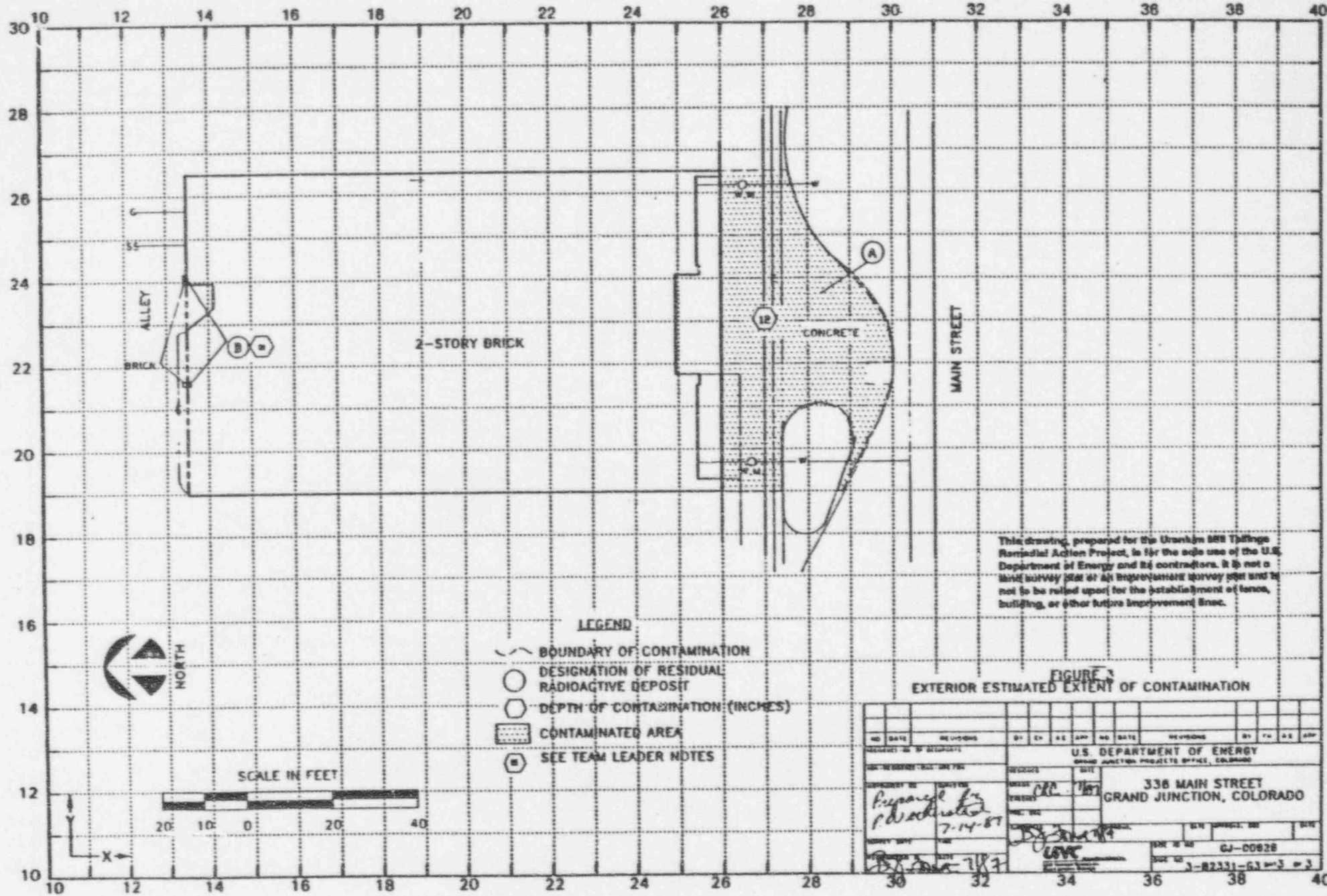


FIGURE 3
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

RADRPT V5.1 <870403.1442> Table 1

Radium Concentrations at Exterior Locations

DOE ID #GJ-00828-CS 336 Main Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In-Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
1	126193	00	DS	<1.0		*	Asphalt alley
2	126224	00	DS	<1.0		*	Asphalt
3	129205	00	DS	1.4		*	Asphalt
4	134189	00	DS	<1.0		*	Asphalt
5	134214	00	DS	1.1		*	Asphalt
6	135200	[36]	DS	<1.0		*	Brick wall
		00	DS	<1.0		*	Asphalt
7	135214	[42]	DS	2.0		*	Brick
8	135216	[12]	DS	22.1		*	Brick
9	135230	00	DS	<1.0		*	Asphalt
10	135240	[36]	DS	27.8		*	Brick
		00	DS	1.0		*	Asphalt
		00	DS	2.1		*	Brick
11	135250	[36]	DS	1.0		*	Brick
		00	DS	1.6		*	Asphalt
12	257265	[24]	DS	2.0		*	Brick wall
		00	DS	2.1		*	Brick walkway
13	260230	00	DS	9.1		*	Concrete
		00	DS	2.2		*	Brick
14	265265	00	DS	24.1		*	West pour/Sidewalk
		00	DS	31.7		*	East pour
15	270190	00	DS	23.6		*	Concrete sidewalk
		00	DS	7.4		*	Red concrete
16	270230	00	DS	8.9		*	South pour
		00	DS	3.8		*	North pour
17	274192	[24]	DS	1.3		*	Planter top/Concrete
		[24]	DS	<1.0		*	Dirt in planter
		[09]	DS	2.5		*	Against brick
		00	DS	8.3		*	Concrete

RADRPT V5.1 <870403.1442> Table 1

Radium Concentrations at Exterior Locations

DOE ID #GJ-00828-CS 336 Main Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In-Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
18	274249	00	DS	5.8		*	South pour
		00	DS	7.1		*	East pour
		00	DS	2.3		*	West pour
		00	DS	5.3		*	North pour
19	276210	00	DS	3.6		*	Concrete sidewalk
20	293217	00	DS	1.7		*	South pour/Concrete
		00	DS	15.0		*	North pour

Measurement Types:
GB = GAD-6 Borehole
GS = GAD-6 Surface
DS = Delta Scintillometer
TC = Total Count Borehole
SS = Soil Sample
DH = Downhole Scintillometer

Notes:
DC = Depth of Contamination
* = No Soil Sample Taken
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 05-04-87
Team Leader = PGW

Summary of Short Form Radiologic Assessment Data

The radiologic assessment of this property has been performed according to the GRJVP Radiologic Support Operations Procedures Manual, Section 24 (draft).

Radiologic data collected by Bendix at DOE ID No. GJ-00829-CS on January 2, 1986, confirmed the presence of contamination in excess of Environmental Protection Agency (EPA) standards at locations indicated from the Oak Ridge National Laboratory (ORNL) inclusion survey (Figure 1). The total area of contamination found by the Bendix survey (Figure 2) was comparable to the areas found by the ORNL survey. Locations of radium concentration measurements from the Bendix survey are shown in Figures 3a and 3b.

INTERIOR FINDINGS

Area Background: 14 uR/h
Exposure Rates in Habitable Areas Range from:
13 to 16 uR/h

Radium concentration measurements are presented in Tables 1 and 2.

Additional information pertinent to this property is discussed in the Team Leader Notes.

MEMORANDUM

ALLIED Bendix
Aerospace

Bendix Field Engineering Corporation
Grand Junction Operations
Grand Junction, Colorado

Date: January 2, 1986

To: Files

From: Carol Holmes

Subject: Team Leader Notes - GJ-00829-CS

FAST-TRACK

Address: 342 Main Street

Owner: Readmore Newsstand
Mary Mason

Year Built: 1902

Team Members

C. Holmes (Team Leader)
T. Coulson
S. Garcia
T. O'Malley
S. Milton
R. Herman
P. Hardy

Instruments

See Operational Equipment Summary sheet

The Colorado Department of Health (CDH) and Oak Ridge National Laboratory (ORNL) found no interior contamination, but located the contaminated city sidewalk south of the structure. The Bendix survey confirmed their data.

This is a commercial building that is occupied by Readmore Newsstand.

This property will be done as a Fast-Track.

Gridding was not done but the entire area north and south of the building was scanned.

The sidewalk along Main Street is contaminated. The red-brick drain, adjacent to the sidewalk, has slightly elevated readings and should be monitored during remedial action.

The gas and sewer lines exit from the north side of the building into the alley. No surface contamination was found. The water line was laid in 1962, and it may possibly be embedded in mill tailings. The depth of the pipe is approximately 42 inches. Coring and augering for the utility lines and the foundation footing was discouraged due to the buried electrical lines and the exact location of the these lines.

The interior range is 110 to 140 counts per second, 14 to 16 uR/h.

The background exposure rate was not obtained. Due to procedures, no background readings will be taken on concrete or ashpalt. The area is surrounded by concrete and asphalt only.

All team members were alpha scanned before leaving the property.

pa
RDRPT V85.3 <851024.1511> Table 1
Radium Concentrations at Exterior Locations
ID #GJ-00829-CS 342 Main Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
2		00	DS	35.2		*	On concrete/Area A
3		00	DS	27.6		*	On concrete/Area A
4		00	DS	3.0		*	On brick
5		00	GS	23.1		*	South sidewalk
		00	DS	1.9		*	In gutter/Area B
6		00	DS	6.5		*	Adjacent to brick
7		00	DS	1.9		*	Gas line
8		00	GS	2.6		*	
		00	DS	1.9		*	
9		00	DS	<1.0		*	
		00	DS	<1.0		*	
		00	DS	<1.0		*	
12		00	DS	2.3		*	On Main Street

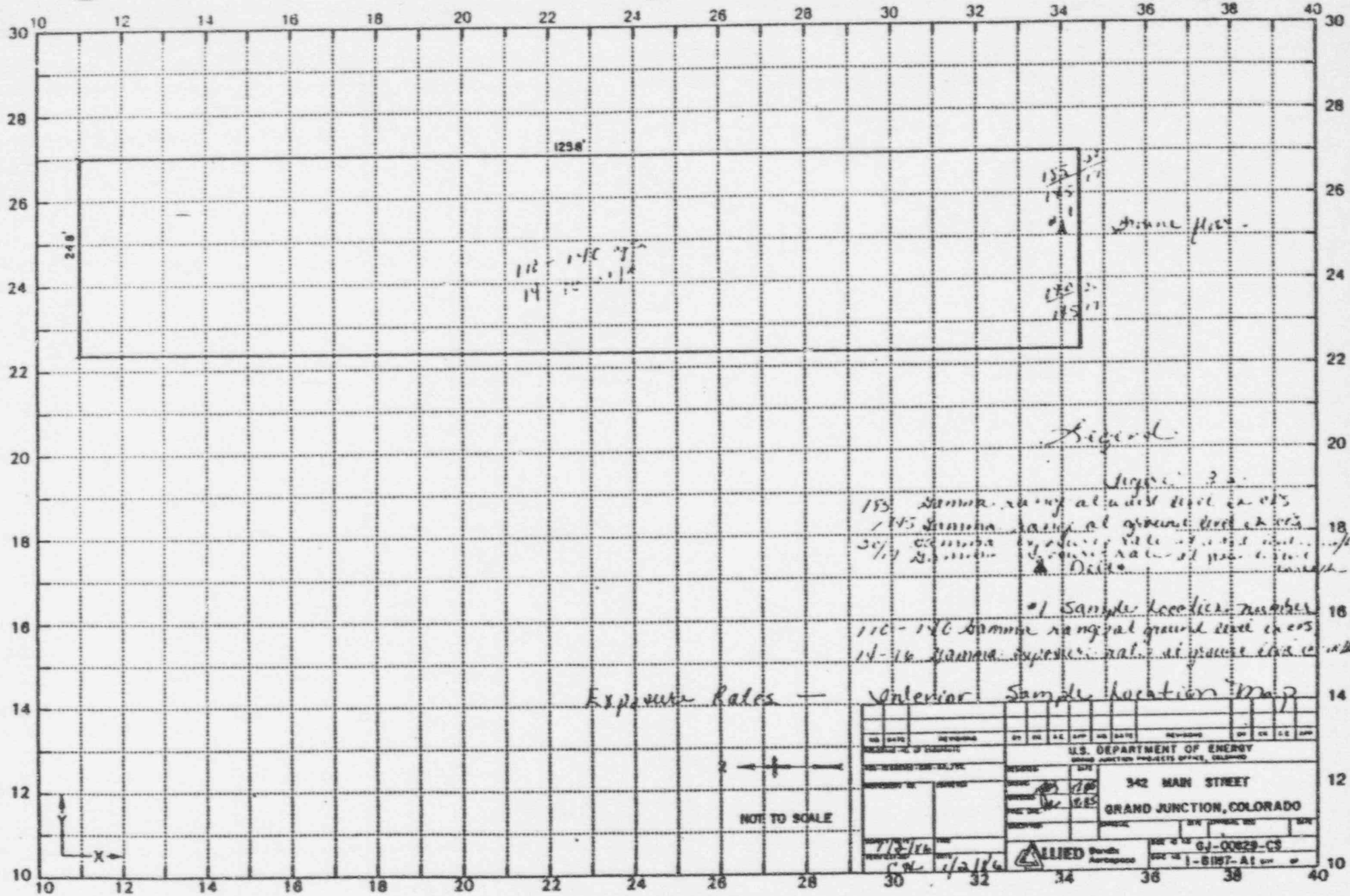
Measurement Types: DS = Delta Scintillometer, GS = GAD-6 Surface

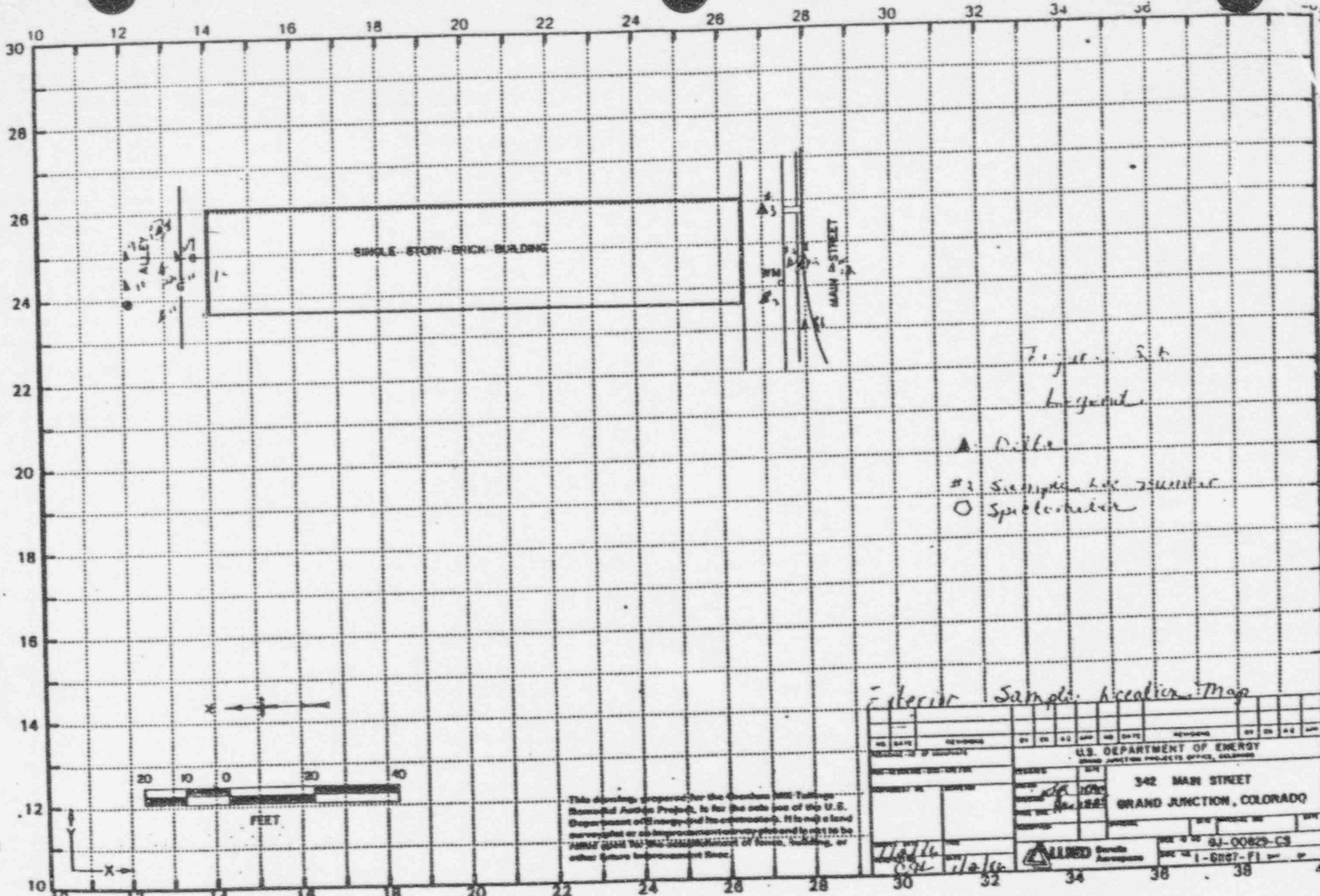
Notes: DC = Depth of Contamination
* = No Soil Sample Taken
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 01-02-86
Team Leader = CH

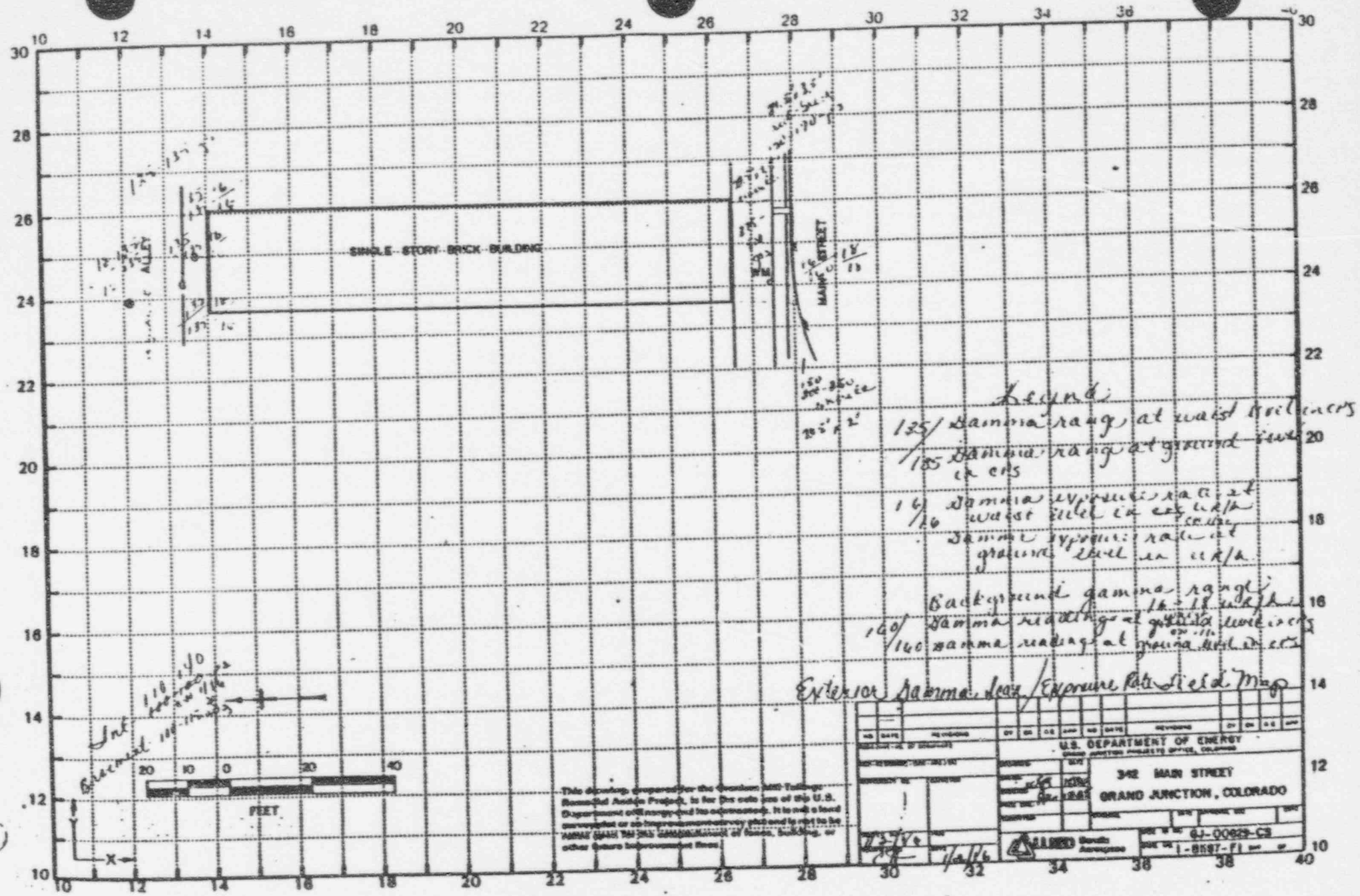
Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
1		00	DS	<1.0		*	Inside south door

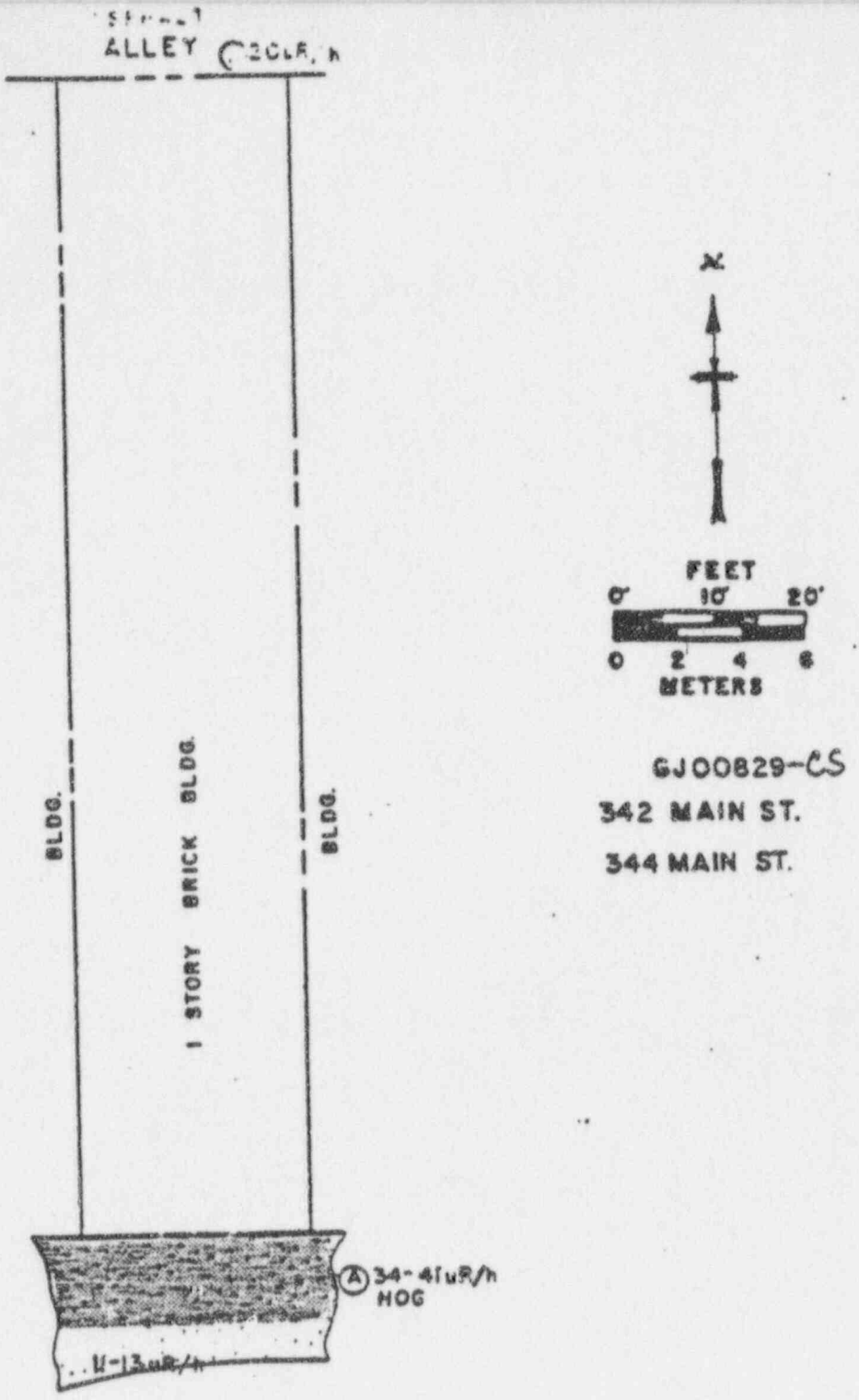
Measurement Types: DS = Delta Scintillometer
GS = GAD-6 Surface

Notes: DC = Depth of Contamination
* = No Soil Sample Taken
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 01-02-86
Team Leader = CH


129.8'
24.6'
Exposure Rates —
Interior Sample location Map
NOT TO SCALE
U.S. DEPARTMENT OF ENERGY
342 MAIN STREET
GRAND JUNCTION, COLORADO
ALLIED Bendix Aerospace
GJ-00629-C3
1-8187-A1


SINGLE STORY BRICK BUILDING
ALLEY
MAIN STREET
WM
Figure 3.1
Legend
▲ Drill
#3 Sampling Loc number
O Spectrometer
FEET
Exterior Sample Location Map
U.S. DEPARTMENT OF ENERGY
342 MAIN STREET
GRAND JUNCTION, COLORADO
GJ-00829-CS
1-GH07-F1


SINGLE STORY BRICK BUILDING
ALLEY
MAIN STREET
Legend:
125/185 Gamma range at waist level in cpm
Gamma range at ground level in cpm
14/16 Gamma exposure rate at waist level in mR/h
Gamma exposure rate at ground level in mR/h
Background gamma range 14-18 mR/h
140/160 Gamma reading at ground level in cpm
Exterior Gamma Dose / Exposure Rate Field Map
FEET
This drawing prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plat or an improvement survey plat and is not to be used or relied upon for the establishment of fence, building, or other future improvement lines.
U.S. DEPARTMENT OF ENERGY
342 MAIN STREET
GRAND JUNCTION, COLORADO
GJ-00629-C3
1-8197-F1



Oak Ridge National Laboratory Inclusion Survey

Figure 1

Fig. 1. Location GJ00829 - 342 Main Street, Grand Junction, Colorado.

CH 1/86

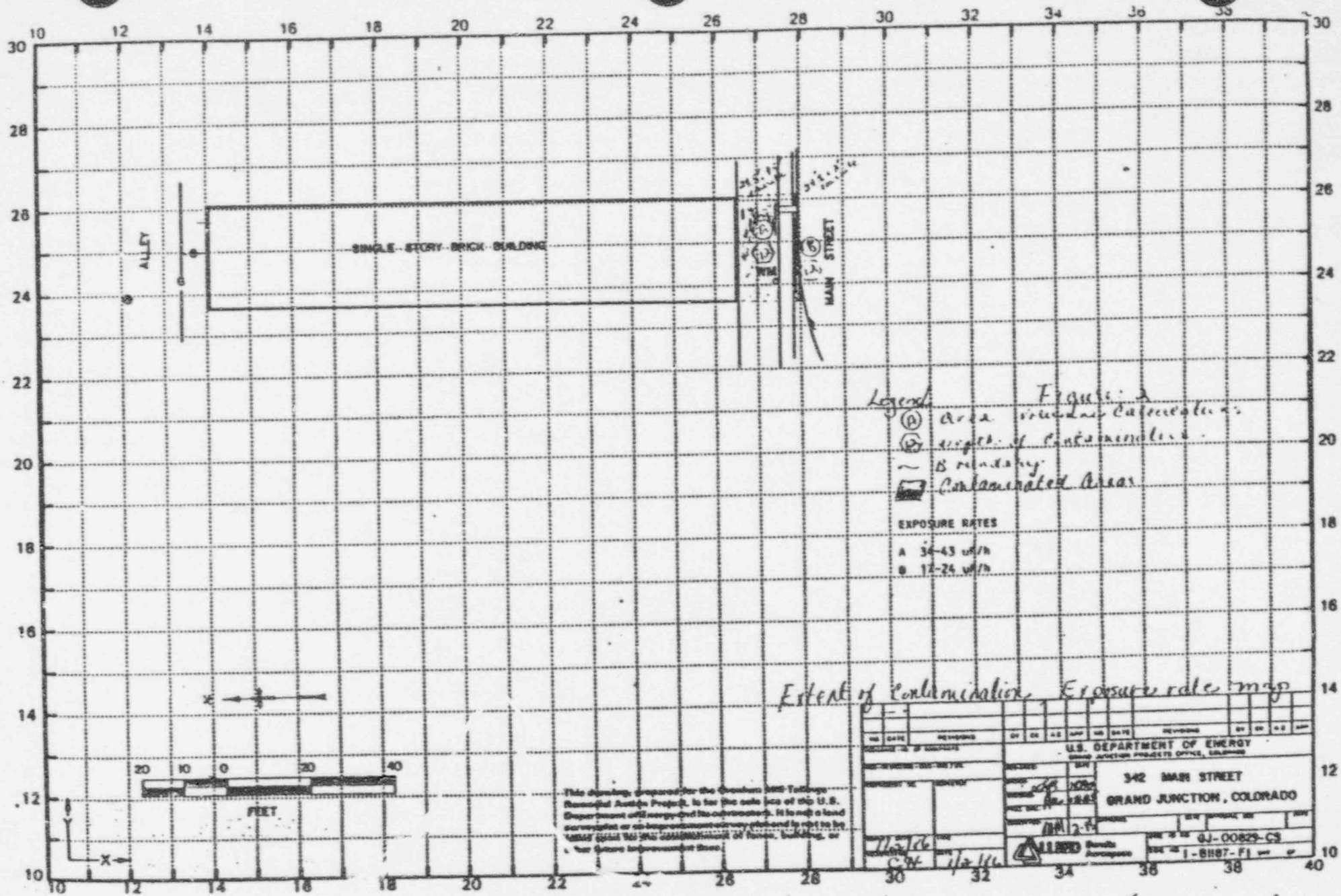


Figure 2

Extent of Contamination, Exposure rate map

Fast track

APPENDIX A

RADIOLOGICAL ASSESSMENT FOR DOE ID No. GJ-00833-CS

CONTENTS

Tables

Figures

EXECUTIVE SUMMARY

1.0 INTRODUCTION

This property is a commercial structure located at 362 Main Street.

Following procedures described in the *Field Assessment Operations Technical Data Procedures Manual*, data were collected on this property and assessed to estimate the location of residual radioactive material in excess of the Environmental Protection Agency (EPA) 'Standards for Remedial Action at Inactive Uranium Processing Sites' (40 CFR 192).

This property has been included for remedial action consideration by UNC Geotech on the basis of spillover contamination contiguous to an included deposit on the adjoining property.

2.0 GAMMA EXPOSURE-RATE SURVEYS

2.1 Exterior

The background is undetermined, because of the concrete/asphalt cover over the property.

The area background is 16 μR/h. Gamma exposure rates range from 15 μR/h to 59 μR/h. Areas of elevated exterior gamma exposure rates are shown in Figure 1.

2.2 Interior

The area background, as determined by UNC Geotech, is 15 μR/h. Gamma exposure rates in the habitable area range from 14 μR/h to 51 μR/h, and there is no area exceeding the EPA standard. Interior gamma exposure-rate survey results are shown in Figure 2.

3.0 RADON/RADON DECAY-PRODUCT CONCENTRATION (RDC)

UNC Geotech radon profile measurements indicate a gross working level of 0.02. The projected annual average RDC indicates this property exceeds the EPA standard.

4.0 EXTENT OF CONTAMINATION

4.1 Exterior

Accumulated data indicate spillover contamination onto the property adjoining the west side of this property. The DOE ID number of the spillover is GJ-00829-CS. The Team Leader Notes provide additional spillover information.

Figure 3 shows the location and types of explorations and radium measurements made; the related radium data are listed in Table 1. Estimated radium concentrations in the contaminated areas range from 5.1 pCi/g to 52.3 pCi/g.

Figure 4a shows the estimated boundaries and depths of exterior contamination. The deposits containing identified residual radioactive materials are characterized as follows:

In the concrete aggregate of and/or beneath the sidewalks and gas meter pad, beneath the concrete slab underlying the planters, and in the soil of the planters.

4.2 Interior

Figure 2 shows the location and types of explorations and radium measurements made, and related radium data are listed in Table 2. Estimated radium concentrations range from 6.0 pCi/g to 18.4 pCi/g in the contaminated areas.

Figure 4b shows the estimated boundaries and depths of interior contamination. The deposits containing identified residual radioactive material are characterized as follows:

In the concrete aggregate of the basement floor and walls of the furnace room and a portion of the north and west basement walls.

5.0 REMEDIAL ACTION RECOMMENDATIONS

5.1 Exterior

Exterior Deposits A through C (Figure 4a) should be remediated as follows:

Remove the portion of the deposits that lie within 10 feet of the building. Supplemental Standards should be considered for the remainder. Removal of spillover contamination on the properties adjoining this property on the north and west side is recommended as part of this remedial action.

5.2 Interior

A recommendation cannot be made at this time. After the exterior contamination is removed from this property, RDC measurements should be retaken. Removal of the dinosaur bones in the basement may be required to obtain a valid RDC measurement. If the final RDC measurements still exceed the standard, it will be necessary to install a vent system in the basement.

TEAM LEADER NOTES

DOE ID NUMBER: GJ-00833-CS

SURVEY DATE: October 13, 1987

TEAM LEADER: D. Fossey

ASSESSMENT TECHNICIAN: B. Durham

Owner: DYP Partnership *Telephone Number:* (303) 623-6238
Tenant: Museum of Western Colorado *Telephone Number:* (303) 242-0971

All deposits described in the historical data were located and investigated. Additional contamination was identified.

The water meter pit was not investigated with a scintillometer.

All utility lines were located.

The lines were not investigated because of the type of surface covers.

The foundation of the building was not investigated.

Interior contamination is associated with the concrete floor slab of the furnace room and the northwest basement wall.

Contamination from this property spills over to the west. The DOE ID number of the spillover property is GJ-00829-CS.

The crawl space under the northeast portion of the building is a "No Access" area.

The sidewalks south and east of the building are contaminated. The sidewalks are estimated to be 4 inches thick with tailings sand beneath them. Contamination underlies the brick wall south of the building. There is a strip of red decorative concrete adjacent to the city sidewalk south of the building which is also underlain with contamination.

:pr

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g) Non-Deconv.	Ra-226 (pCi/g) Deconv.	Working Level	Comments
1	118150	00	DS	16.4			North pour
		00	DS	44.8			South pour
2	120140	00	DS	7.3			Red concrete
		00	DS	29.0			Sidewalk
3	130277	[04]	DS	17.5			Hz/On foundation
		00	DS	2.5			Asphalt/Shine
4	160275	00	DS	1.5			Asphalt
		00	DS	9.6			Concrete
5	166135	[06]	DS	3.8			Hz/On brick
		00-06	SS	6.7			
		00	DS	10.3			Dirt
		00	DS	18.3			On concrete
		06	DS	10.4			Visible tailings @6"
		06	DS	52.3			Hz/Under concrete
		12	DS	3.8			
6	175150	00	DS	1.1			Tile
		00	DS	35.8			Concrete
7	210150	[06]	DS	1.7			Hz/Tile wall
		00	DS	51.4			Sidewalk
8	220276	[04]	DS	1.6			Hz/Concrete foundatn
		00	DS	1.1			Asphalt
9	235136	00	DS	6.2			North pour
		00	DS	10.5			South pour
10	240145	00	DS	<1.0			Concrete/East pour
		00	DS	18.7			West pour
11	245169	00	DS	3.3			Sidewalk/South pour Shine
		00	DS	17.6			North pour
12	245275	00	DS	5.1			Concrete/North pour
		00	DS	35.6			South pour

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g) Non-Deconv.	Ra-226 (pCi/g) Deconv.	Working Level	Comments
13	250220	00	DS	<1.0			In gutter

Measurement Types:
RP = Radon Profile
GS = GAD-6 Surface
DS = Delta Scintillometer
TC = Total Count Borehole
SS = Soil Sample
DH = Downhole Survey

Notes:
DC = Depth of Contamination
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 10-13-87
Team Leader = DF

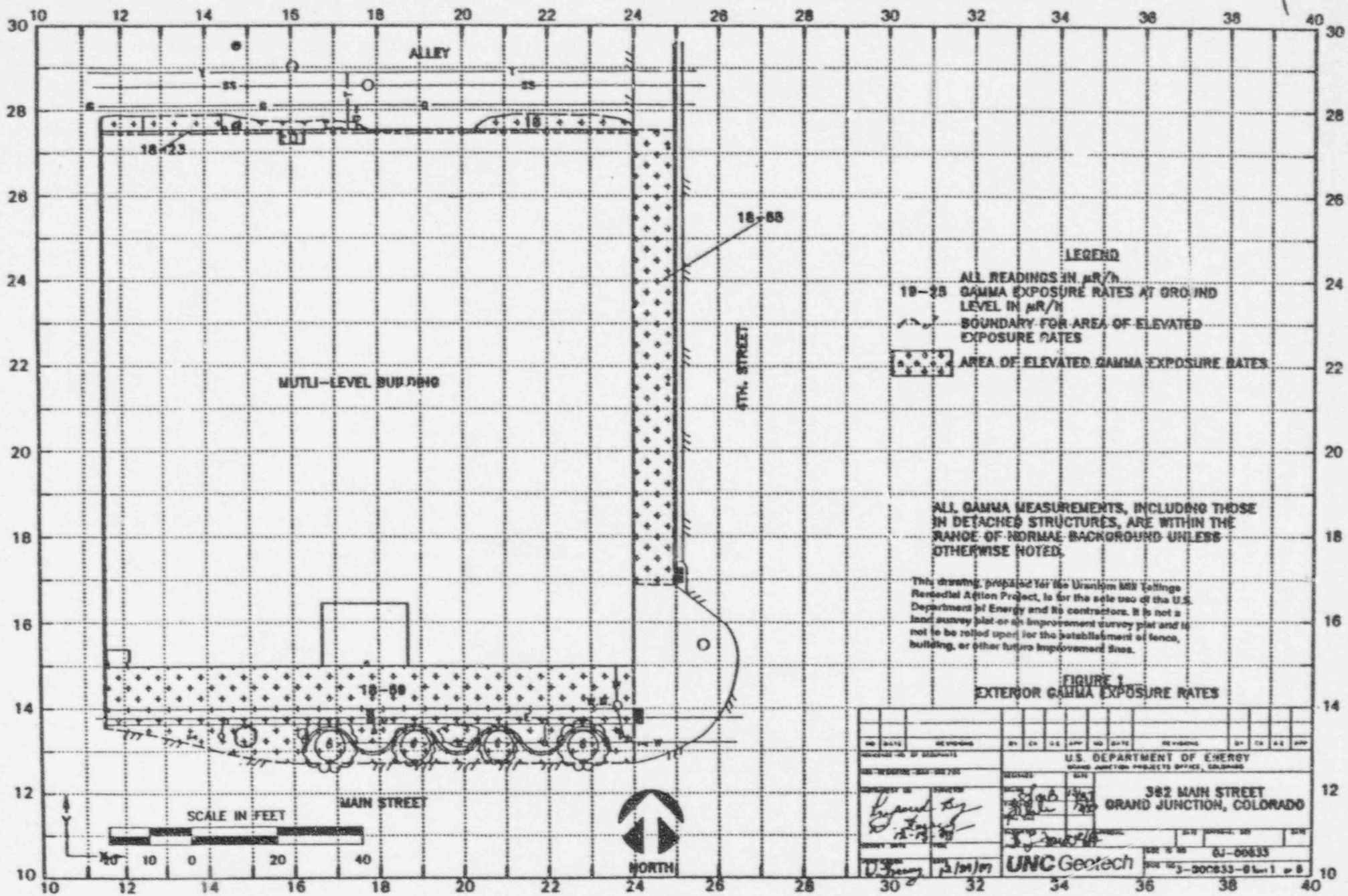
Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g) Non-Deconv.	Ra-226 (pCi/g) Deconv.	Working Level	Comments
14	124230	[08]	DS	<1.0			On wall
15	124241	[08]	DS	14.7			On wall
16	130155	00	DS	1.2			Concrete
17	133277	[60]	DS	15.3			On wall
		00	DS	<1.0			Concrete floor
18	145125	00	DS	1.1			Concrete
19	170275	00	DS	1.3			Tile/concrete
		03	TC	3.9	3.9		Auger refusal
		06	TC	3.4	2.9		DC = 0 inches
		09	TC	3.2	2.8		
		12	TC	3.2	3.2		
20	206269	00	DS	1.2			Concrete floor
		00	DS	1.6			East pour
		00	DS	1.5			West pour
21	215265	[08]	DS	11.8			On wall
22	220130	00	DS	1.7			Tile on concrete
23	220269	00	DS	7.3			Bolier room
		03	TC	7.4	7.4		DC = 4 inches
		06	TC	6.3	7.5		Based on all
		09	TC	4.5	2.4		available data
		12	TC	3.9	3.2		
		15	TC	3.7	3.7		
		18	TC	3.5	3.1		
		21	TC	3.5	3.5		
		24	TC	3.5	3.3		
		27	TC	3.6	3.6		
		30	TC	3.7	3.7		
		33	TC	3.8	3.6		
		36	TC	4.0	4.2		
		39	TC	4.1	4.3		
		42	TC	4.1	3.9		
		45	TC	4.2	4.6		
		48	TC	4.1	3.6		
		51	TC	4.3	4.3		
24	222277	[06]	DS	18.4			On wall
		00	DS	6.0			Concrete floor

Radium Concentrations at Interior Locations

Loc #	Grid Location	Depth (in.)	Meas. Type	Ra-226 (pCi/g) Non-Deconv.	Ra-226 (pCi/g) Deconv.	Working Level	Comments
25	270130	00	DS	<1.0			Concrete
		03	TC	4.5	4.5		DC = 0 inches
		06	TC	3.9	3.2		
		09	TC	3.7	3.0		
		12	TC	3.9	4.3		
		15	TC	3.9	4.1		
		18	TC	3.8	3.8		
26	270140	00	DS	1.4			Tile on concrete

Measurement Types:
RP = Radon Profile
GS = GAD-6 Surface
DS = Delta Scintillometer
TC = Total Count Borehole
SS = Soil Sample
DH = Downhole Survey

Notes:
DC = Depth of Contamination
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 10-13-87
Team Leader = DF


ALLEY
18-23
18-68
MUTLI-LEVEL BUILDING
4TH. STREET
18-59
MAIN STREET
SCALE IN FEET
-10 10 0 20 40
NORTH
LEGEND
ALL READINGS IN μR/h
19-25 GAMMA EXPOSURE RATES AT GROUND LEVEL IN μR/h
BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES
AREA OF ELEVATED GAMMA EXPOSURE RATES
ALL GAMMA MEASUREMENTS, INCLUDING THOSE IN DETACHED STRUCTURES, ARE WITHIN THE RANGE OF NORMAL BACKGROUND UNLESS OTHERWISE NOTED.
This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plat or an improvement survey plat and is not to be relied upon for the establishment of fence, building, or other future improvement lines.
FIGURE 1
EXTERIOR GAMMA EXPOSURE RATES
U.S. DEPARTMENT OF ENERGY
382 MAIN STREET
GRAND JUNCTION, COLORADO
UNC Geotech
GJ-00833

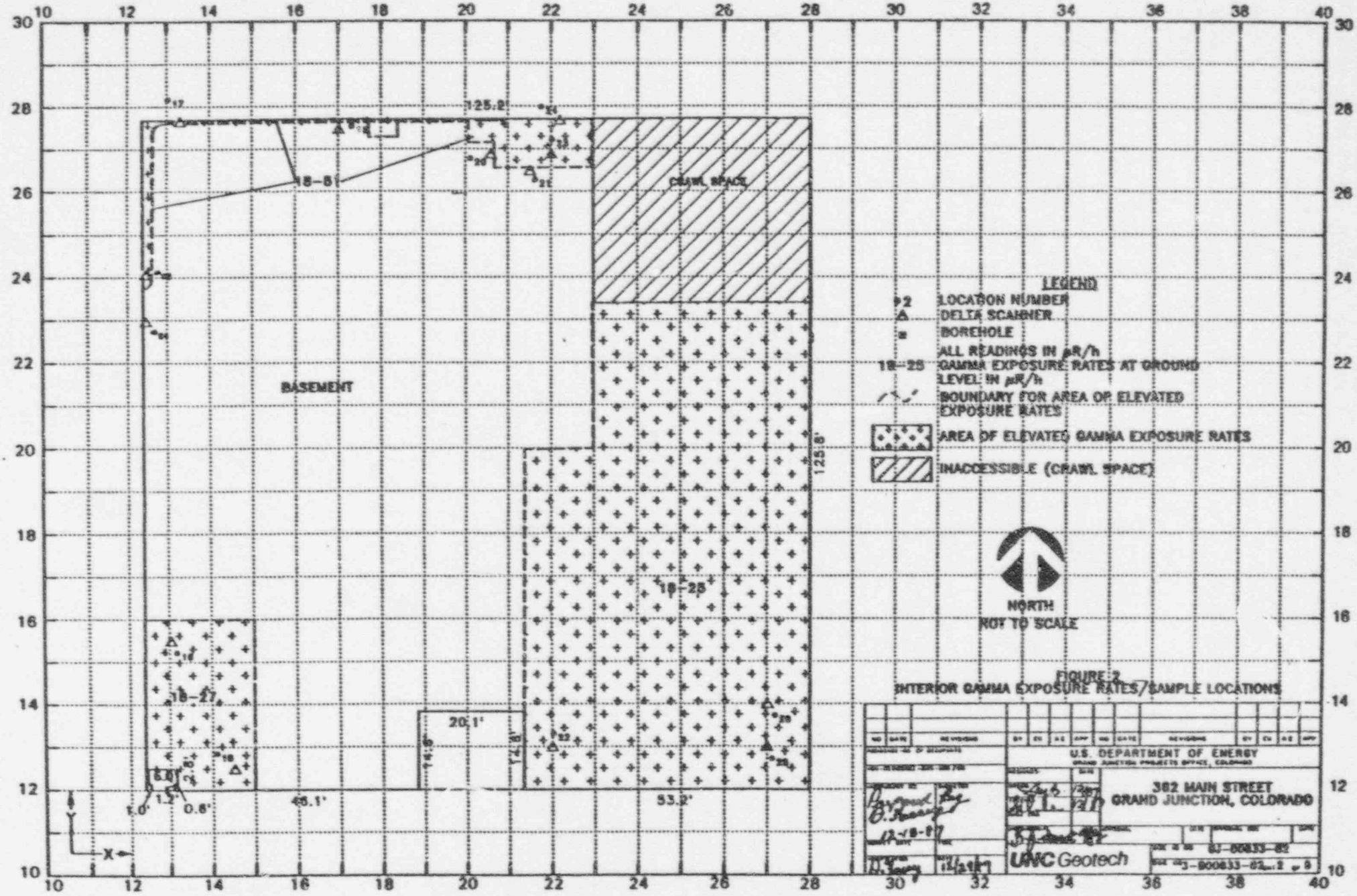


FIGURE 2
INTERIOR GAMMA EXPOSURE RATES/SAMPLE LOCATIONS

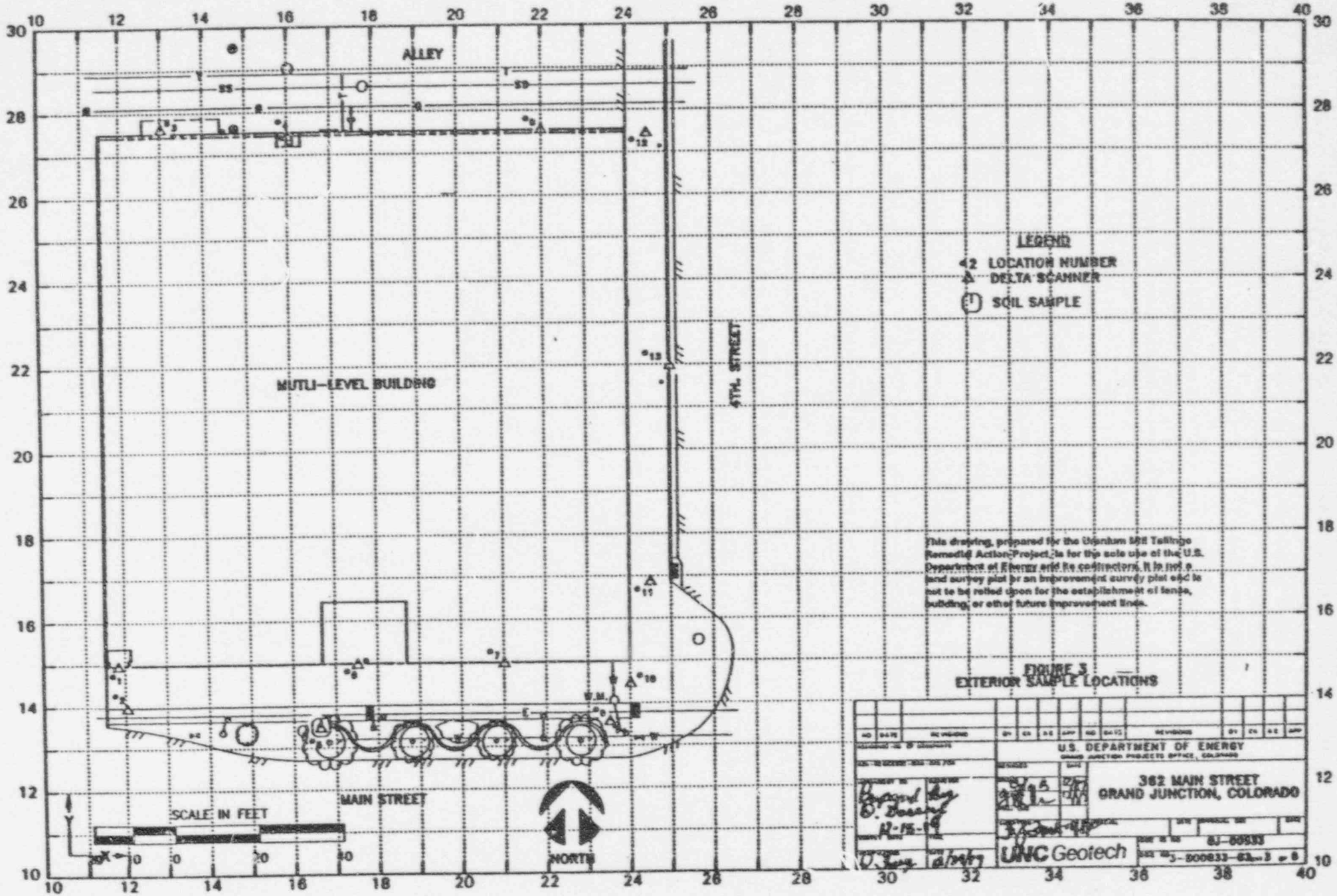


FIGURE 3
EXTERIOR SAMPLE LOCATIONS

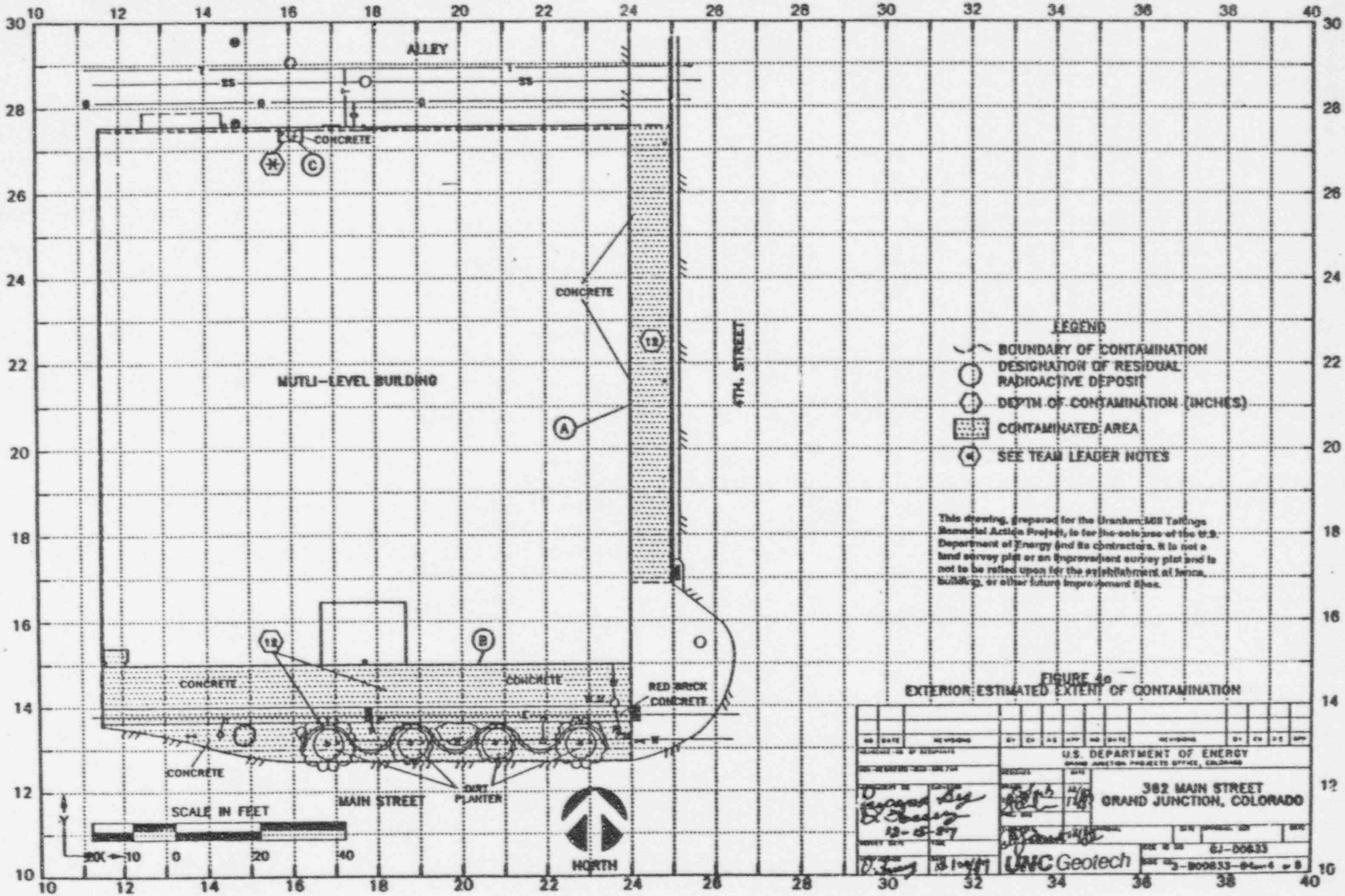


FIGURE 4a
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

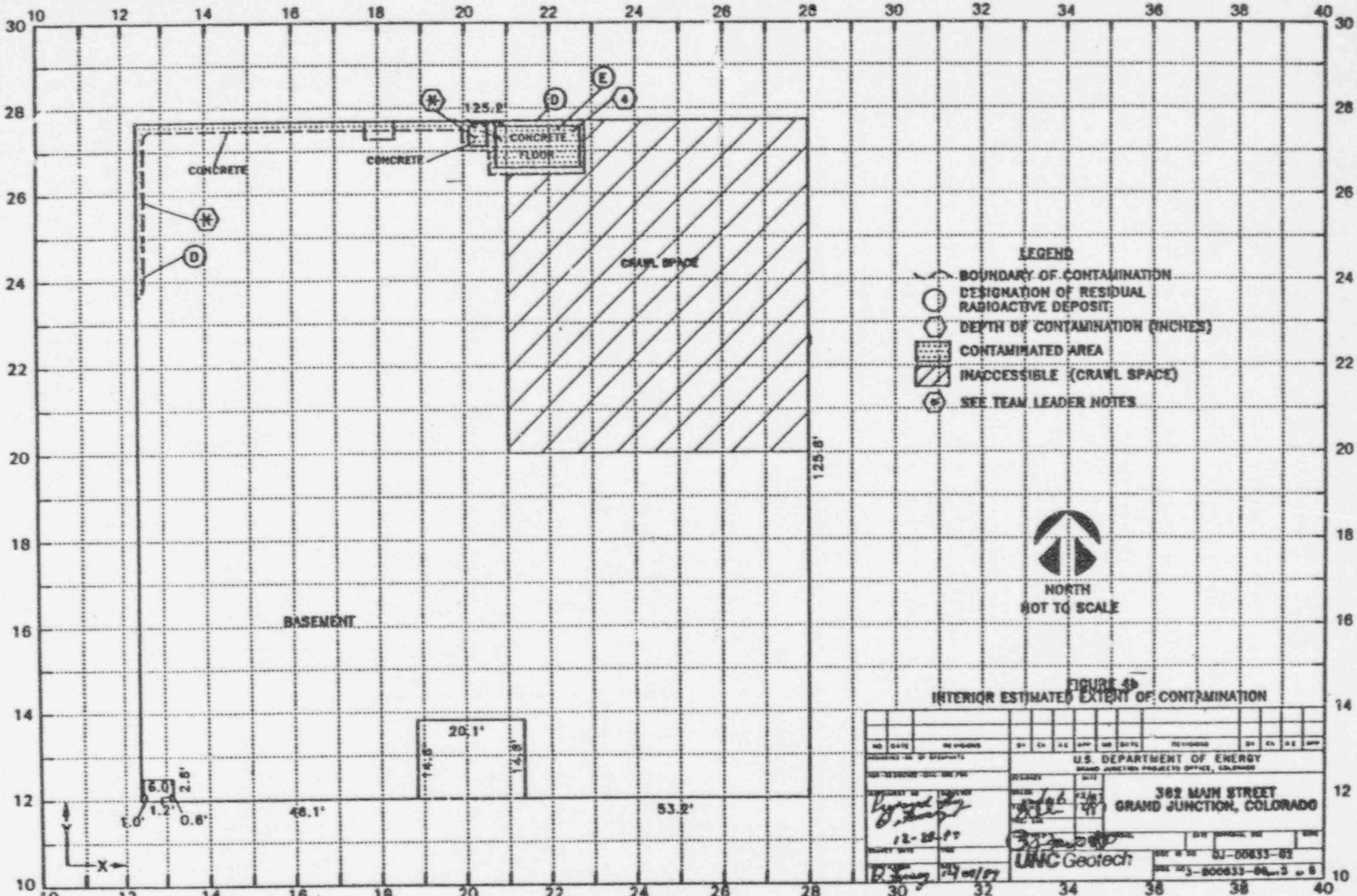


FIGURE 4b
INTERIOR ESTIMATED EXTENT OF CONTAMINATION

3.0 RADIOLOGIC SURVEY

3.1 Introduction

Radiologic data were collected by Bendix at DOE ID No. GJ-00814-CS on January 22, 1986. Data collection methods were performed in accordance with procedures fully described in the Radiologic Support Operations Procedures Manual GJ-07(84) (Bendix Field Engineering Corporation, 1984). These data were evaluated to determine the areal and vertical extent of uranium mill tailings contamination at this property as well as any other contaminated material that may have originated from the millsite.

A review of the historical information available for this property was conducted to determine the areas of potential contamination identified during previous radiologic assessments.

The Bendix radiologic survey was designed to investigate the entire property, with emphasis on previously identified areas of contamination. Conclusions based upon data analyses are discussed in Section 3.5, Extent of Contamination. Photocopies of the Memo of Understanding, team leader notes, and Exterior Gamma Scan map are included in the Appendix (Section 4.0).

3.2 Gamma Exposure-Rate Surveys

3.2.1 Exterior Findings

Area Background: 15 uR/h
Gamma Exposure Rates Range from: 14 to 54 uR/h

Exterior gamma exposure-rate survey results are shown in Appendix Figure 3.1.

3.2.2 Interior Findings

Area Background: 15 uR/h
Gamma Exposure Rates in Habitable Areas Range from:
14 to 19 uR/h

Interior gamma exposure-rate measurements are summarized in Appendix Table 3.2.

3.3 Boreholes, Soil Samples, and Other Measurements

Area Background: Undetermined at this time

Areas which displayed elevated gamma levels were further investigated; the locations and types of these investigations are shown in Appendix Figures 3.2a and 3.2b. Data from these investigations are included in Appendix Tables 3.1 and 3.2.

3.4 Radon/Radon-Daughter Concentration (RDC)

Determined by DOH: 0.019 gross working level (WL).
No RDC measurements were taken by Bendix.

Extent of Contamination

Appendix Figure 3.3 shows identified areas and estimated depths of contamination on this property, based on assessments of all measurements taken. As noted in this figure, areas recommended for remedial action that contain identified residual radioactive materials are:

(Area A) Surface Material: Concrete
Location: North of the structure
Other Directions: Adjacent to Main Street
Total Depth of Contamination: Estimated at 12 inches
Other (height or thickness): 3-inch-thick concrete
Comments: The water line, storm drain, and planters are in this area.
Approximate Square Footage:

ALLIED Bendix
Aerospace

Bendix Field Engineering Corporation
Grand Junction Operations
Grand Junction, Colorado

Date: January 22, 1986

To: Files

From: Carol Holmes

Subject: Team Leader Notes - GJ-00814-CC

Address: 307 Main Street

Occupied By: Curtis Mathes

Year Built: 1905

Team Members

C. Holmes (Team Leader)
M. Duran
S. Garcia
T. O'Malley
R. Herman

Instruments

See Operational Equipment Summary sheet

This property is a commercial complex occupied by Curtis Mathes. The building was built in 1905.

The Colorado Department of Health (CDH) took air samples from September 1981 to March 1982, to determine the gross radon-daughter concentration (RDC) level, which did not exceed the Environmental Protection Agency (EPA) standards. The level was found to be .019 working level (WL). The city sidewalk was found to be contaminated as well.

Oak Ridge National Laboratory's (ORNL's) survey found only the northern section of the city sidewalk and an area of concrete surrounding the planters to be contaminated.

Our Bendix crew gridded and scanned the entire property. The exterior survey concluded a contaminated city sidewalk, north of the structure. There is an area of sidewalk, adjacent to Main Street that was also found to be contaminated.

There is a red-brick cobblestone walk adjacent to the city sidewalk that houses a storm drain. Milling tailings may extend beneath this area also. This will have to be monitored during remedial action.

Coring and augering were discouraged due to all the electrical lines along Main Street. The water and sewer lines were not investigated because the exact location was not found. The gas line was free of contamination.

The contaminated concrete will be called to a 12-inch depth removal.

The interior readings along the west brick wall were slightly elevated but the delta readings found the interior to be contamination free.

No background delta measurements were taken due to the are being surrounded by concrete or asphalt.

All team members were alpha scanned before leaving the property.

Departure time: 11:00 AM

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
7	134240	00	DS	12.3		*	North of primary structure
8	134260	00	DS	20.0		*	Northeast of primary structure
9	137233	00	DS	<1.0		*	Northwest planter
10	137253	00	DS	1.4		*	North center planter
11	137273	00	DS	<1.0		*	Northeast planter
12	140223	00	DS	4.7		*	North sidewalk
13	140258	00	DS	11.3		*	Northeast of primary structure
	144223	00	DS	1.9		*	North sidewalk
	144250	00	DS	1.0		*	North of primary structure
16	145215	00	DS	<1.0		*	Northwest sidewalk
17	148245	00	DS	35.6		*	North of primary structure
18	148268	00	DS	23.4		*	Northeast of primary structure
19	150225	00	DS	47.2		*	North sidewalk
20	153245	00	DS	2.3		*	North entrance
21	157214	00	DS	<1.0		*	West sidewalk
22	158236	00	DS	1.4		*	North entrance
23	158252	00	DS	1.4		*	North entrance
24	281222	00	DS	<1.0		*	Gas line
		36	DS	<1.0		*	On gas line

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
25	281240	[48]	DS	3.1		*	Brick wall
		00	DS	1.3		*	South of primary
		[48]	GS	2.5		*	structure

Measurement Types:
GB = GAD-6 Borehole
GS = GAD-6 Surface
DS = Delta Scintillometer
TC = Total Count Borehole
SS = Soil Sample
DH = Downhole Scintillometer

Notes:
DC = Depth of Contamination
* = No Soil Sample Taken
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 01-22-86
Team Leader = CH

RDRPT V85.3 <860109.1551> Table 3.2

Radium Concentrations at Interior Locations

ID #GJ-00814-CS 307 Main Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
1		00	DS	1.0		*	West room/Room A
2		00	DS	<1.0		*	Center of Room A
3		[36]	DS	2.3		*	Room A
		00	DS	<1.0		*	
4		[24]	DS	2.1		*	Northwest corner of
		00	DS	1.2		*	Room B
5		00	DS	1.7		*	Northeast corner of Room B
6		00	DS	<1.0		*	Southeast corner of Room B

Measurement Types:
GB = GAD-6 Borehole
GS = GAD-6 Surface
DS = Delta Scintillometer
TC = Total Count Borehole
SS = Soil Sample
DH = Downhole Scintillometer

Notes:
DC = Depth of Contamination
* = No Soil Sample Taken
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 01-22-86
Team Leader = CH

pa

Table 3.3
Summary of Interior Gamma Exposure Rates

Location	Number of Readings Taken at Waist Level	Range at Waist Level (uR/h)	Mean at Waist Level (uR/h)	Number of Readings Taken at Surface	Range at Surface (uR/h)	Mean Surface (uR/h)
Room A	09	14-19	17	09	14-18	16
Room B	09	14-19	16	09	15-19	16
Ground Floor	*	*	*	*	14-16	*

* A walking gamma scan was performed to confirm the absence of interior contamination.

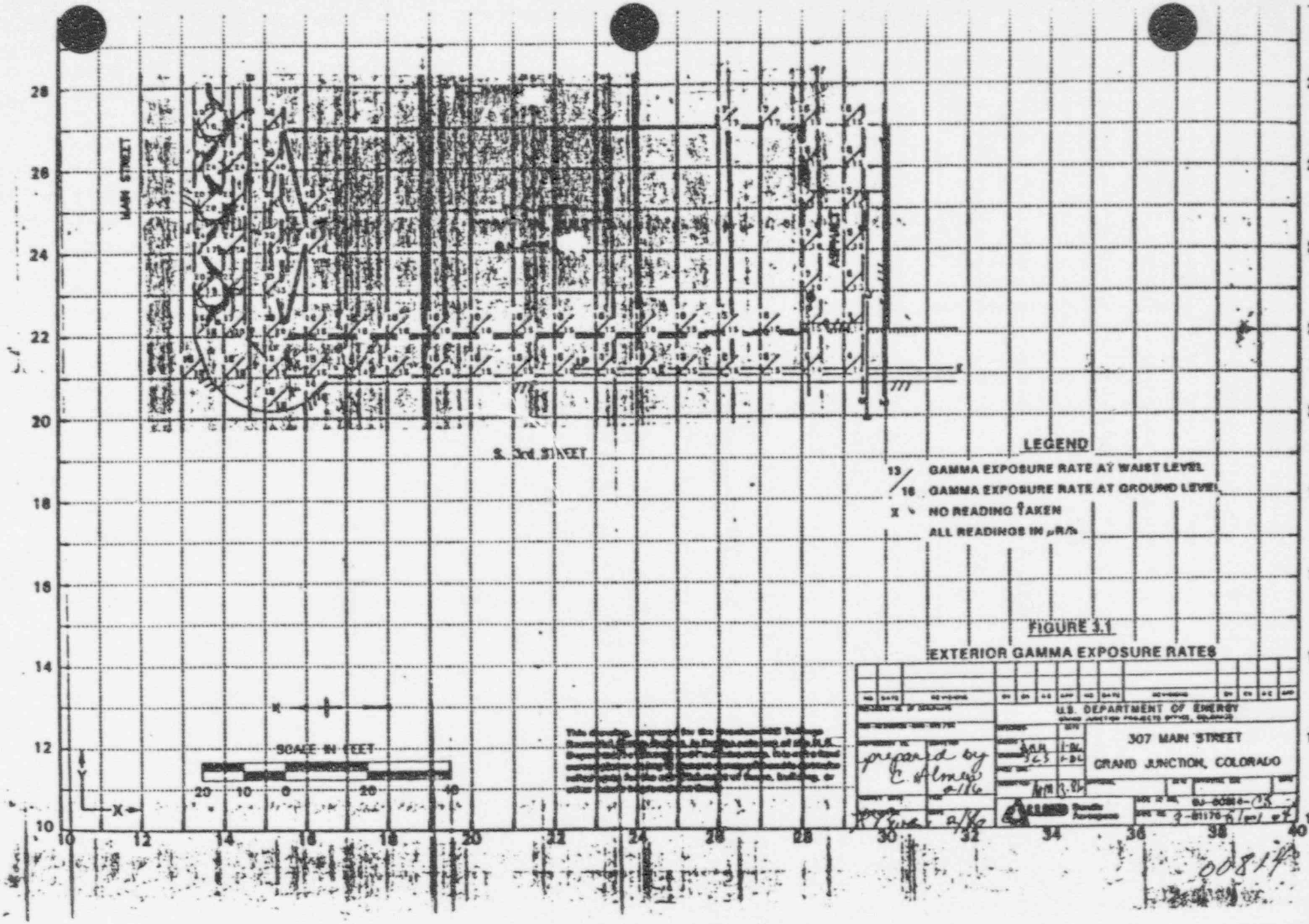


FIGURE 3.1

EXTERIOR GAMMA EXPOSURE RATES

0081

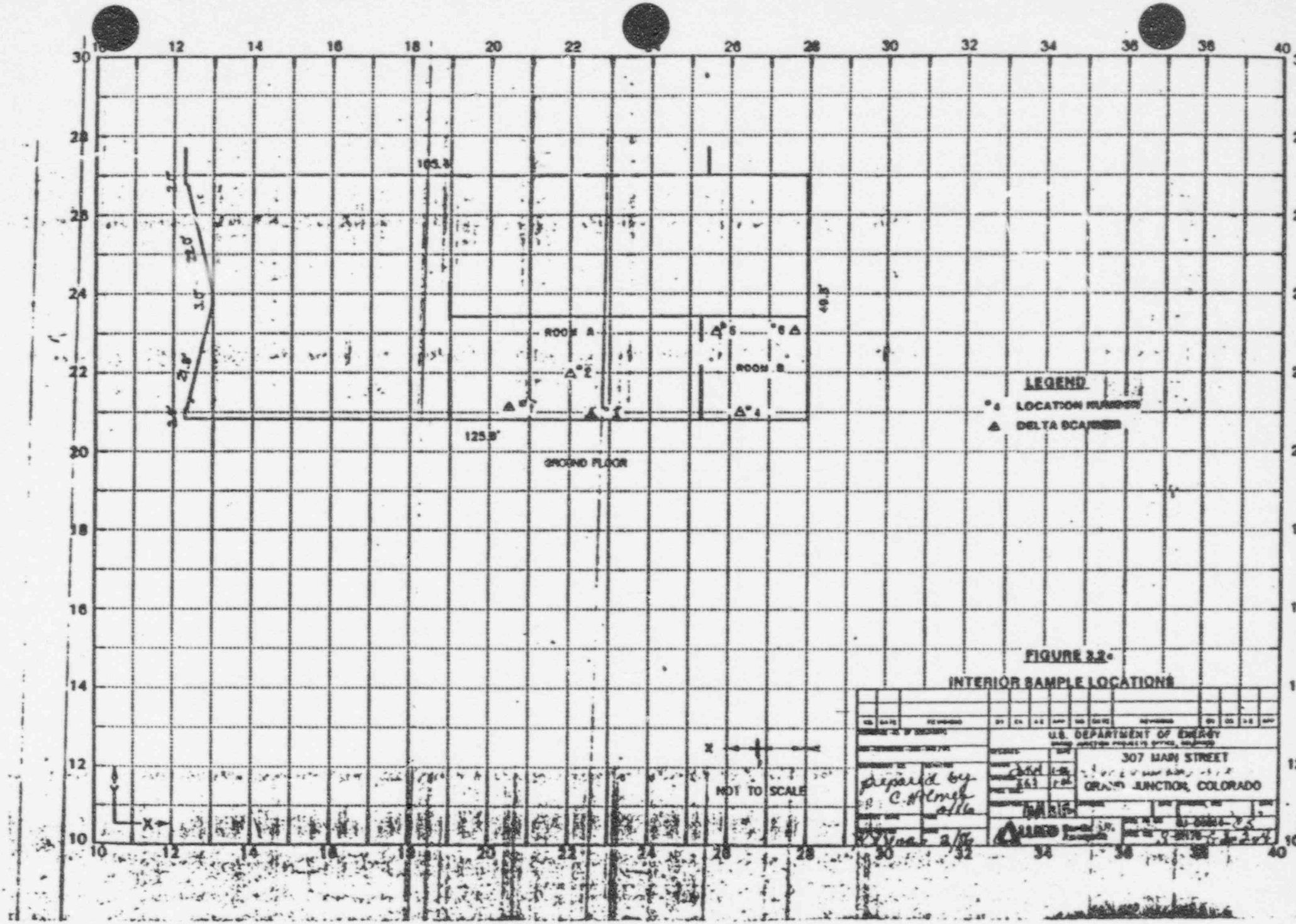


FIGURE 3.2-6

INTERIOR SAMPLE LOCATIONS

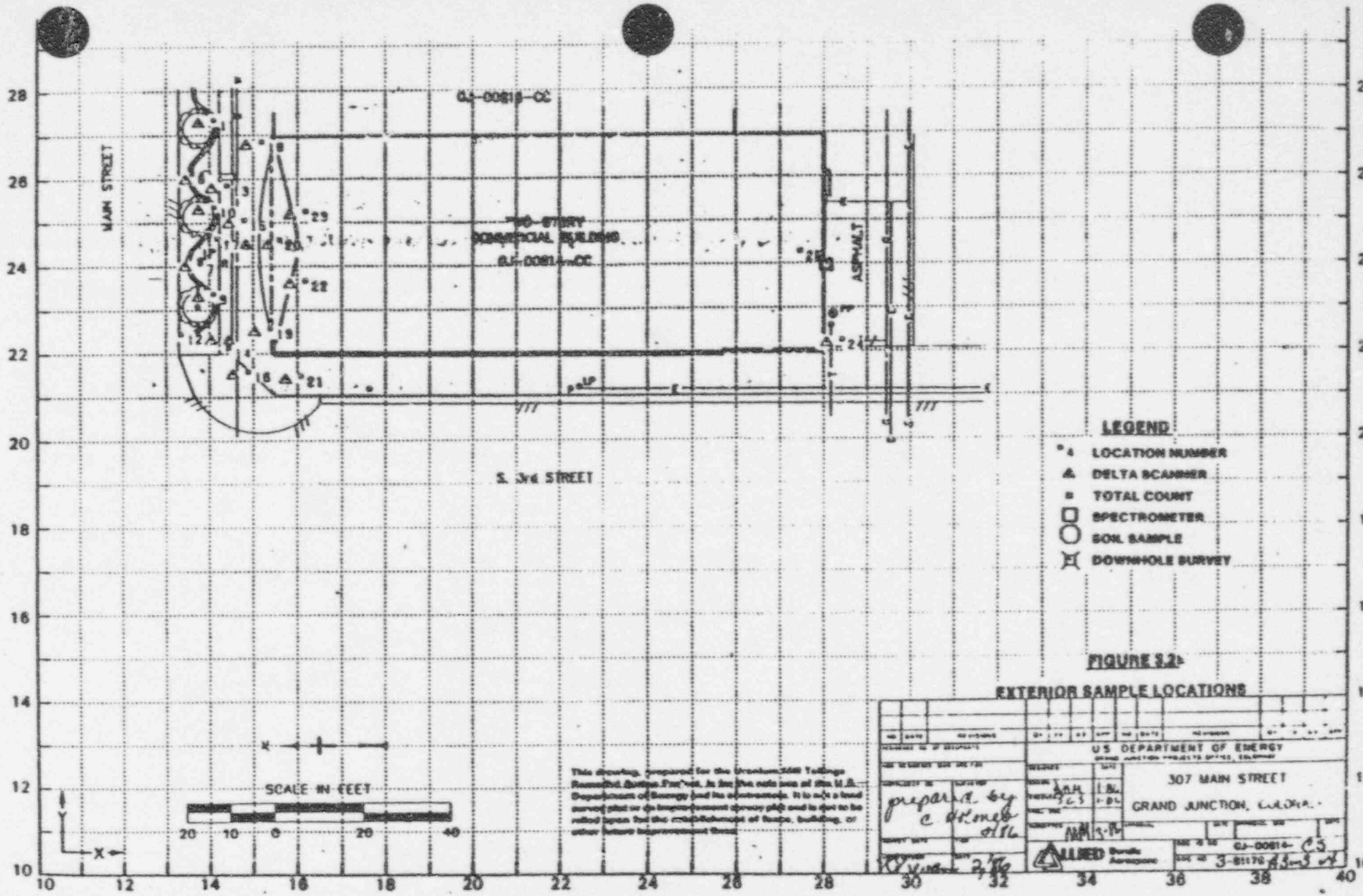


FIGURE 3.2-1

EXTERIOR SAMPLE LOCATIONS

This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plat or an improvement survey plat and is not to be relied upon for the establishment of fence, building, or other future improvement lines.

U.S. DEPARTMENT OF ENERGY

307 MAIN STREET
GRAND JUNCTION, COLORADO

prepared by C. Dennis 8/16

ALLIED Bendix Aerospace

GJ-00814-C5
3-81170 A5-3 of 4

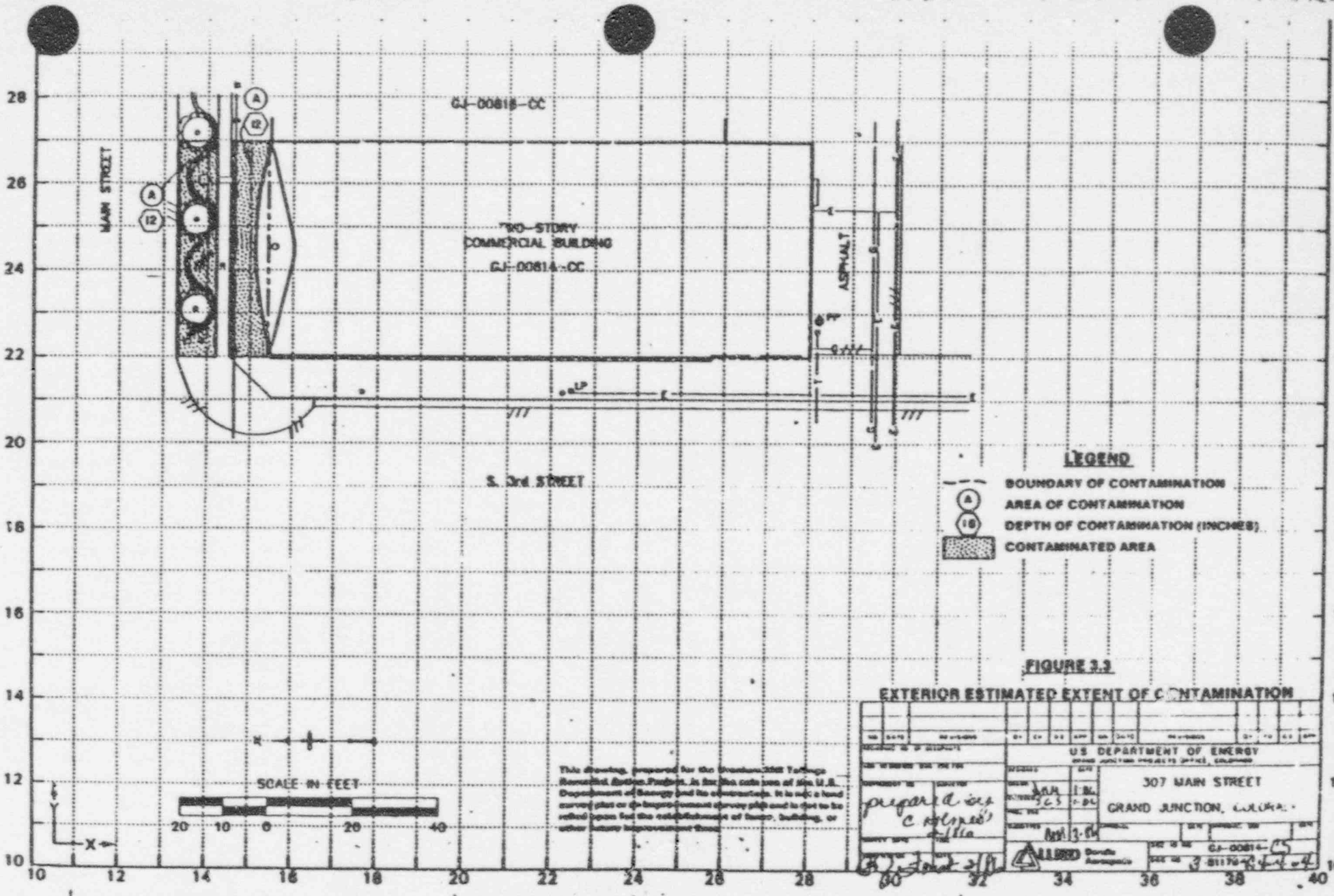


FIGURE 3.3

EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

US DEPARTMENT OF ENERGY

307 MAIN STREET

GRAND JUNCTION, COLORADO

GJ-00814-CC

GJ-00816-CC
MAIN STREET
TWO-STORY
COMMERCIAL BUILDING
GJ-00814-CC
ASPHALT
S. 3rd STREET
LEGEND
GAMMA READINGS OF 100 TO 199 cpm
GAMMA READINGS OF 200 TO 500 cpm
GAMMA READINGS OF >500 cpm
SCALE IN FEET
20 10 0 20 40
X
Y
EXTERIOR GAMMA SCAN
Appendix Page
US DEPARTMENT OF ENERGY
307 MAIN STREET
GRAND JUNCTION, COLORADO
prepared by
C. Holmes
2/86
GJ-00814-25
61-27

Summary of Short Form Radiologic Assessment Data

The radiologic assessment of this property has been performed according to the GRJVP Radiologic Support Operations Procedures Manual, Section 24 (draft).

Radiologic data collected by Bendix at DOE ID No. GJ-0061E-CC on January 2, 1986, confirmed the presence of contamination in excess of Environmental Protection Agency (EPA) standards at locations indicated from the Oak Ridge National Laboratory (ORNL) inclusion survey (Figure 1). The total area of contamination found by the Bendix survey (Figure 2) was comparable to the areas found by the ORNL survey. Radiologic measurement locations from the Bendix Bendix survey are shown in Figure 3.

EXTERIOR FINDINGS

Area Background: Not applicable

INTERIOR FINDINGS

Area Background: 15 uR/h
Exposure Rates in Habitable Areas Range from:
14 to 21 uR/h

Radium concentration measurements are presented in Tables 1 and 2.

Additional information pertinent to this property is discussed in the Team Leader Notes.

MEMORANDUM

ALLIED Bendix
Aerospace

Bendix Field Engineering Corporation
Grand Junction Operations
Grand Junction, Colorado

Date: January 2, 1986

To: Files

From: Terry Coulson

Subject: Team Leader Notes - GJ-00816-CC

FAST-TRACK

Address: 309 Main Street

Estate of: Amos Raso, Roland A. Raso, Amora L. Bley, and Wilhimetta J. Cortese

Contact: Shari Raso

Arrival Time: 9 AM

Team Members

T. Coulson (Team Leader)
P. Hardy
S. Milton
S. Garcia
C. Holmes
R. Herman

Instruments

See Operational Equipment Summary sheet

This property is jointly owned by the estate of Amos Raso, Roland A. Raso, Amora L. Bley, and Wilhimetta J. Cortese. The Bendix team arrived at approximately 9 AM. This property took approximately one-hour to survey.

Elevated readings were detected in the front sidewalk and in the front of the store.

The gas line was investigated. Other utility lines were not investigated due to Health and Safety advising not to auger on Main Street because of numerous buried electrical lines.

The background exposure rates and delta readings were undetermined, as all the surfaces were either concrete or asphalt.

The area under the red colored concrete should be monitored during remedial action. According to Don Nugent of the City Engineering Department, tailings were removed to a depth of 12 inches when the new storm drains were installed (1980 to 1981). However, tailings remain in many areas where utility lines are deeply buried.

The interior readings ranged from 15 to 18 uR/h at the front of the store and 14 to 16 uR/h at the back of the store. Colorado Department of Health (CDH) found no evidence of tailings under the structure. Oak Ridge National Laboratory (ORNL) detected elevated gammma readings from the city sidewalk.

All team members were alpha scanned before leaving the property.

RDRPT V65.3 <851024.1511> Table 1

Radium Concentrations at Exterior Locations

[redacted] #GJ-00816-CC 309 Main Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
3		00	DS	4.3		*	On concrete/Area A
4		00	DS	1.9		*	On red concrete
5		00	GS	23.5		*	North city sidewalk
		00	DS	30.3		*	Area A
6		00	DS	29.0		*	On concrete
7		00	DS	1.3		*	On asphalt
8		00	DS	<1.0		*	
9		00	DS	<1.0		*	On asphalt Alley
10		00	GS	3.3		*	On dirt in planter
		00	DS	<1.0		*	
[redacted]		00	DS	10.0		*	On concrete/Area A
12		00	GS	1.7		*	Background
		00	DS	<1.0		*	On asphalt
13		00	DS	1.6		*	On asphalt
14		00	DS	1.2		*	Gas line
		06	DS	1.4		*	
		12	DS	<1.0		*	
		24	DS	<1.0		*	On gas line

Measurement Types: DS = Delta Scintillometer
GS = GAD-6 Surface

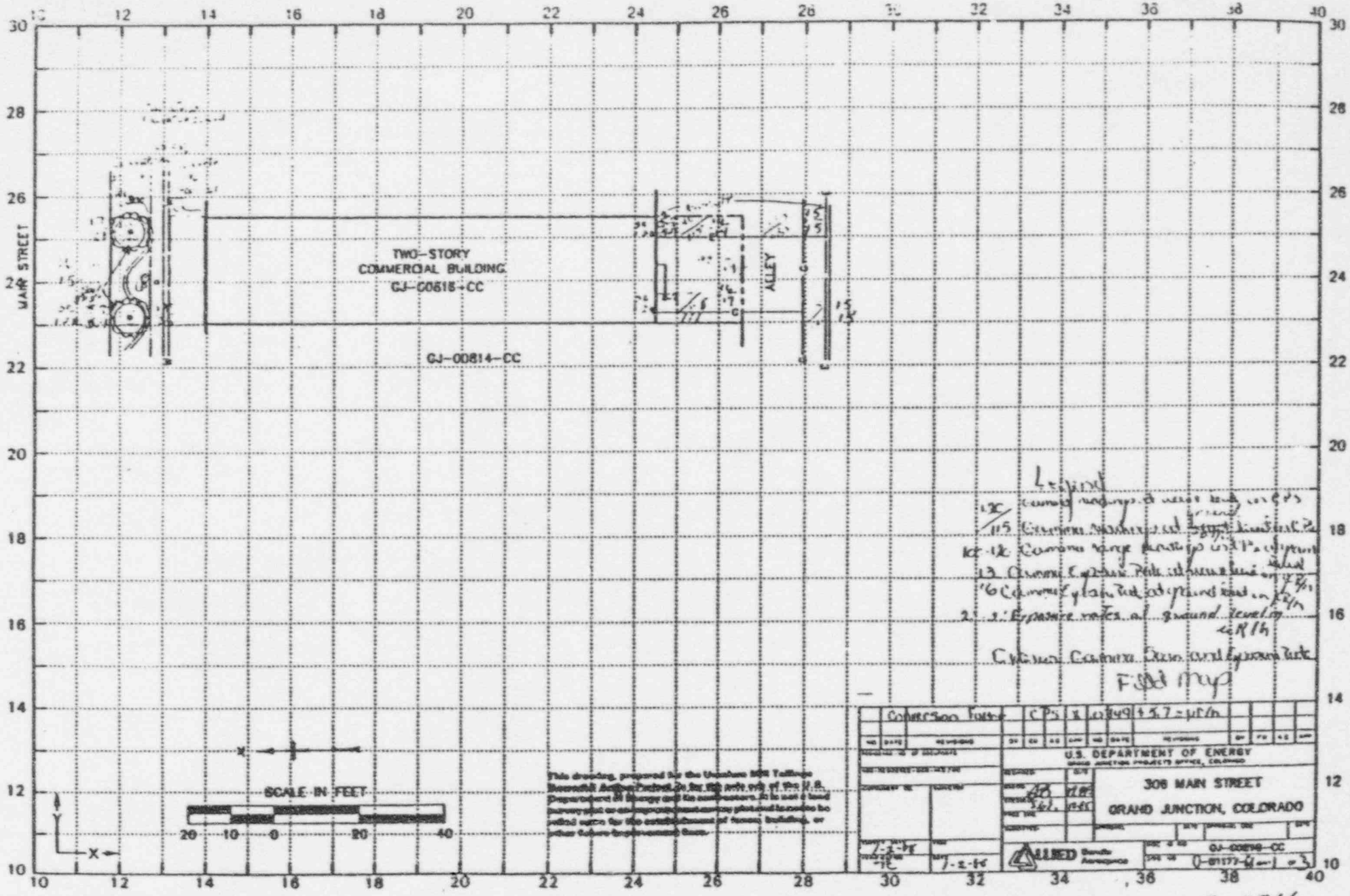
Notes: DC = Depth of Contamination
* = No Soil Sample Taken
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 01-02-86
Team Leader = TC

pa
RDRPT V85.3 <851024.1511> Table 2
Radium Concentrations at Interior Locations
D #GJ-00816-CC 309 Main Street Page 1 of 1

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
1		00	DS	1.8		*	North wall
2		00	DS	<1.0		*	Adjacent to east wall

Measurement Types: DS = Delta Scintillometer

Notes: DC = Depth of Contamination
* = No Soil Sample Taken
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 01-02-86
Team Leader = TC



Last track

F00816

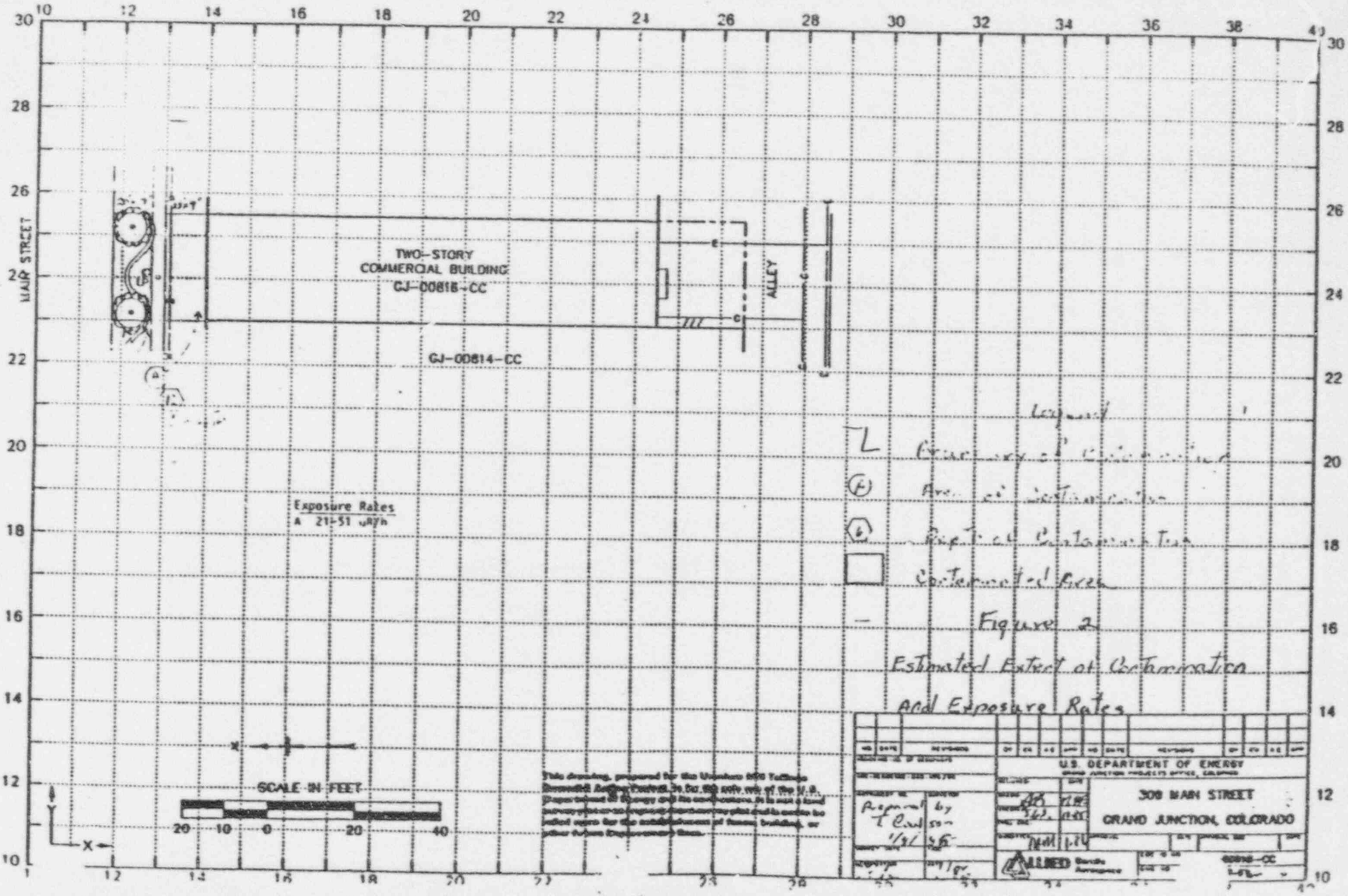


Figure 2
Estimated Extent of Contamination
And Exposure Rates

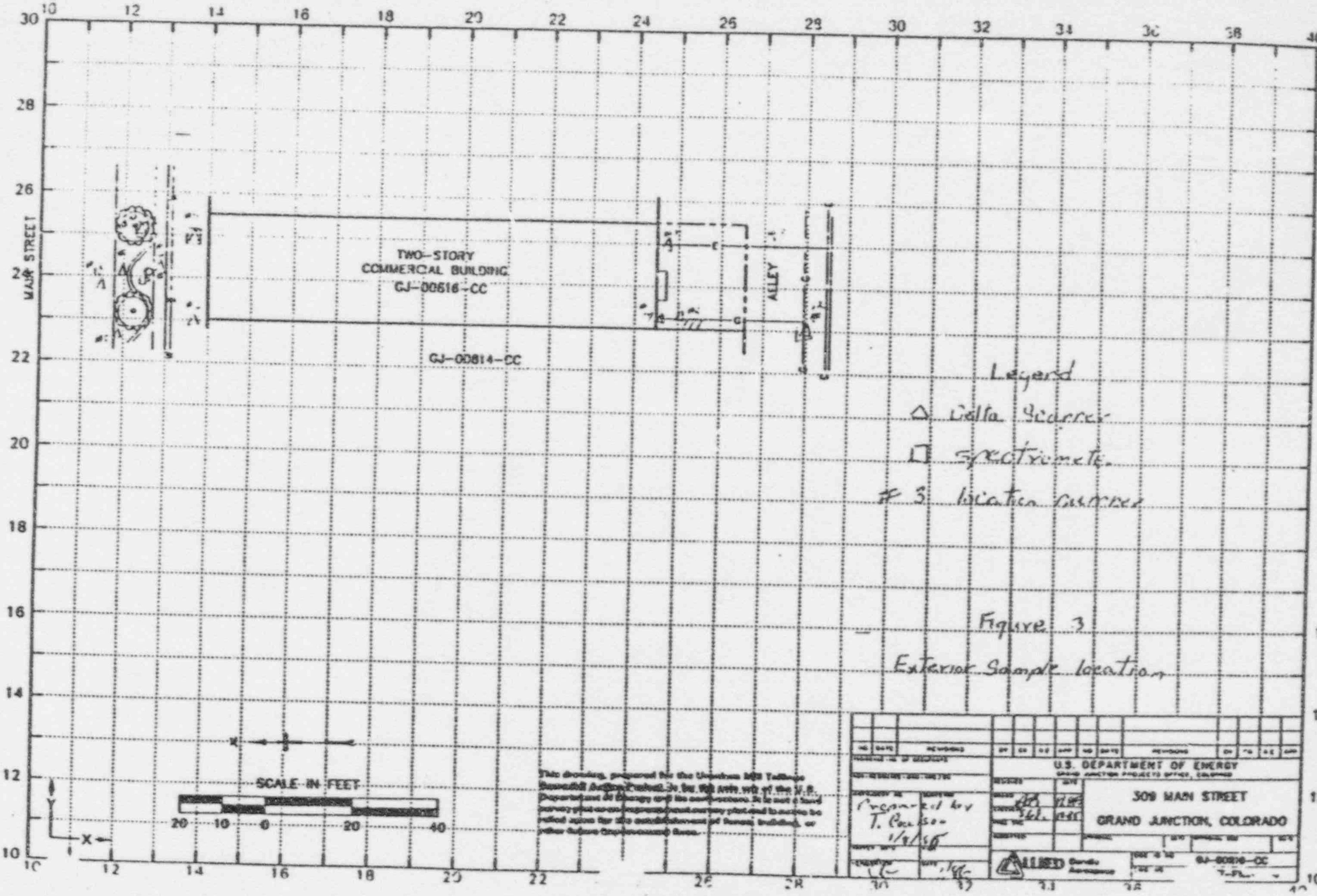
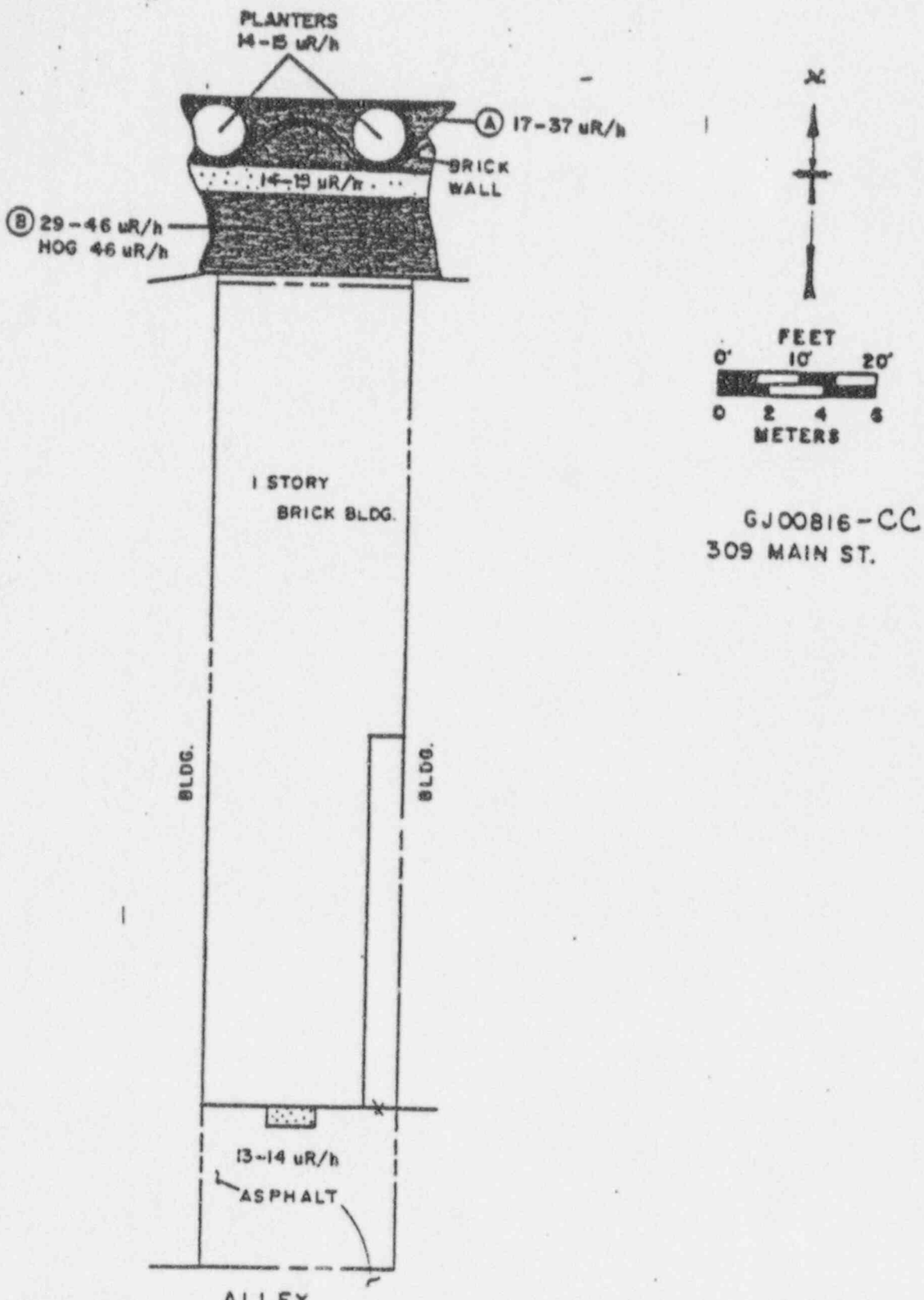


Figure 3

Exterior Sample location



ORNL Contamination Map T Coulson 1/16/86

Fig. 1. Location GJ00816 - 309 Main Street, Grand Junction, Colorado.

.0 RADIOLOGIC SURVEY

3.1 Introduction

Radiologic assessment data were collected by Bendix at DOE ID No. GJ-00818-CS on March 28, 1986. Data collection methods were performed in accordance with procedures fully described in the Radiologic Support Operations Procedures Manual GJ-07(86) (Bendix Field Engineering Corporation, 1986). These data were evaluated to determine the areal and vertical extent of uranium mill tailings contamination at this property as well as any other contaminated material that may have originated from the millsite. The assessment data collected on this property were analyzed and determined to be in excess of the Environmental Protection Agency (EPA) criteria as set forth in the 'Standards for Remedial Action at Inactive Uranium Processing Sites' (40 CFR 192).

A review of the historical information available for this property was conducted to determine the areas of potential contamination identified during previous radiologic assessments.

3.2 Gamma Exposure-Rate Surveys

3.2.1 Exterior Findings

Area Background: Not available due to surface cover
Gamma Exposure Rates Range from: 14 to 84 uR/h

Exterior gamma exposure-rate survey results are shown in Appendix Figure 3.1.

3.2.2 Interior Findings

Area Background: 16 uR/h
Gamma Exposure Rates in Habitable Areas Range from:
14 to 17 uR/h

Interior gamma exposure-rate measurements are summarized in Appendix Table 3.2.

3.3 Boreholes, Soil Samples, and Other Measurements

Area Background: Not available due to surface cover

Areas which displayed elevated gamma levels were further investigated; the locations and types of these investigations are shown in Appendix Figure 3.2. Data from these investigations are included in Appendix Table 3.1

3.4 Radon/Radon-Daughter Concentration (RDC)

No RDC measurements were taken by Bendix.

3.5 Extent of Contamination

Appendix Figure 3.3 shows identified areas and estimated depths of contamination on this property, based on assessments of all measurements taken. As noted in this figure, areas recommended for remedial action that contain identified residual radioactive materials are:

(Area A) In-Situ Ra-226: 38.8 pCi/g
Surface Material: Concrete
Subsurface Material: T/base
Location: City sidewalk
Total Depth of Contamination: 12 inches
Other (height or thickness): 4-inch-thick concrete
Comments: This area includes two deposits. One deposit includes a round raised circular planter which is not contaminated.
Approximate Square Footage: 581.0

(Area B) In-Situ Ra-226: 128.3 pCi/g
Surface Material: Asphalt
Subsurface Material: T/base
Location: South of structure
Total Depth of Contamination: 12 inches
Other (height or thickness): 3-inch-thick asphalt
Comments: This deposit is found at the base of the gas meter. The gas line will need to be investigated further during remedial action.
Approximate Square Footage: 23.0

(Areas Requiring Further Investigation During Remedial Action)

The gas line may be embedded in tailings and should be closely monitored during remedial action.

Additional information pertinent to this property is discussed in the Team Leader Notes.

Team Leader Notes

<860626.1117>

Date: March 28, 1986

To: Files

From: Cordell Adams

Subject: Team Leader Notes - GJ-00818-CS

Address: 315 Main Street

Owner: Estate of Amos L. Raso c/o, Shari A. Raso

Mailing Address: P.O. Box 2328, Grand Junction, CO 81502

Telephone: (303) 245-0333

Year Built: 1911

Team Members: (TL) C. Adams, E. Goad, N. Wallace, C. Pope

Instruments: See Operational Equipment Summary

Colorado Department of Health (CDH) and Oak Ridge National Laboratory (ORNL) data indicate elevated gamma readings associated with the city sidewalk north of the structure.

An interior gamma survey was performed to confirm the absence of interior contamination and characterize the gamma exposure rates within habitable areas of the structure. The range of interior gamma readings for habitable areas of the structure is 100 to 140 counts per second (cps) (14 to 17 uR/h). The interior gamma survey indicated no contamination. The footing/ foundation was not investigated.

The Bendix survey team gamma scanned the entire property. Elevated readings were found associated with a section of the city sidewalk north of the structure and a point source south of the structure.

A point source was found at the base of the gas line, adjacent to the structure. No depth readings are to be taken on Main Street properties. This area should be closely monitored during remedial action.

All locations were determined by baselines pulled from the east and south sides of the structure.

Area A is north of the structure.

Area B is south of the structure.

Further investigations with delta scintillometer measurements were conducted to establish the lateral extent of contamination.

The depths of contamination for Areas A and B are based on common construction practices.

The range of gamma readings in background areas is 100 to 130 cps (14 to 16 uR/h). The average background equivalent-radium concentration was not determined due to the ground cover being asphalt and concrete.

The utility lines were not investigated as noted above.

There is spillover contamination from this property to the adjacent properties, however no spillover package is incluled for sidewalks. The property to the west is GJ-00816-CS and the property to the east is GJ-00821-CS.

The property was returned to pre-survey condition before the Bendix survey team departed.

Even though elevated readings were found on the red brick section on sidewalk, north of the primary structure, this area was not included as part of the extent of contamination. These elevated readings may be caused by shine from the adjacent contamination. This area will need to be closely monitered during remedial action.

Revist: April 9, 1986

Team Member: N. Wallace

Instruments: See Operational Equipment Summary

The purpose of the revisit was to gather more delta data on the sidewalk in order to determine if the brick section of the sidewalk was contaminated.

RADRPT V4.1 <860317.1503> Table 3.1

Radium Concentrations at Exterior Locations

ID #GJ-00818-CS 315 Main Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
1	125266	00	DS	2.5		*	On brick
2	130260	00	DS	38.8		*	On concrete
3	134266	00	DS	2.5		*	On brick
4	134274	00	DS	17.9		*	On concrete
5	136254	00	DS	1.3		*	On concrete
6	140130	00	DS	1.5		*	On asphalt/Over gas line
7	140140	00	DS	<1.0		*	On asphalt/Over gas line
8	140149	00	DS	128.3		*	On asphalt/Over gas line
9	141270	00	DS	<1.0		*	In raised planter
10	144266	00	DS	1.7		*	On brick
11	148259	00	DS	34.5		*	On concrete

Measurement Types: Ds = Delta Scintillometer

Notes: DC = Depth of Contamination
* = No Soil Sample Taken
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 03-28-86
Team Leader = CA

Table 3.2
Summary of Interior Gamma Exposure Rates

DOE ID No. GJ-00818-CS 315 Main Street

Location	Number of Readings Taken at Waist Level	Range at Waist Level (uR/h)	Mean at Waist Level (uR/h)	Number of Readings Taken at Surface	Range at Surface (uR/h)	Mean Surface (uR/h)
Ground Floor	*	*	*	*	14-17	*

* A walking gamma scan was performed to confirm the absence of interior contamination.

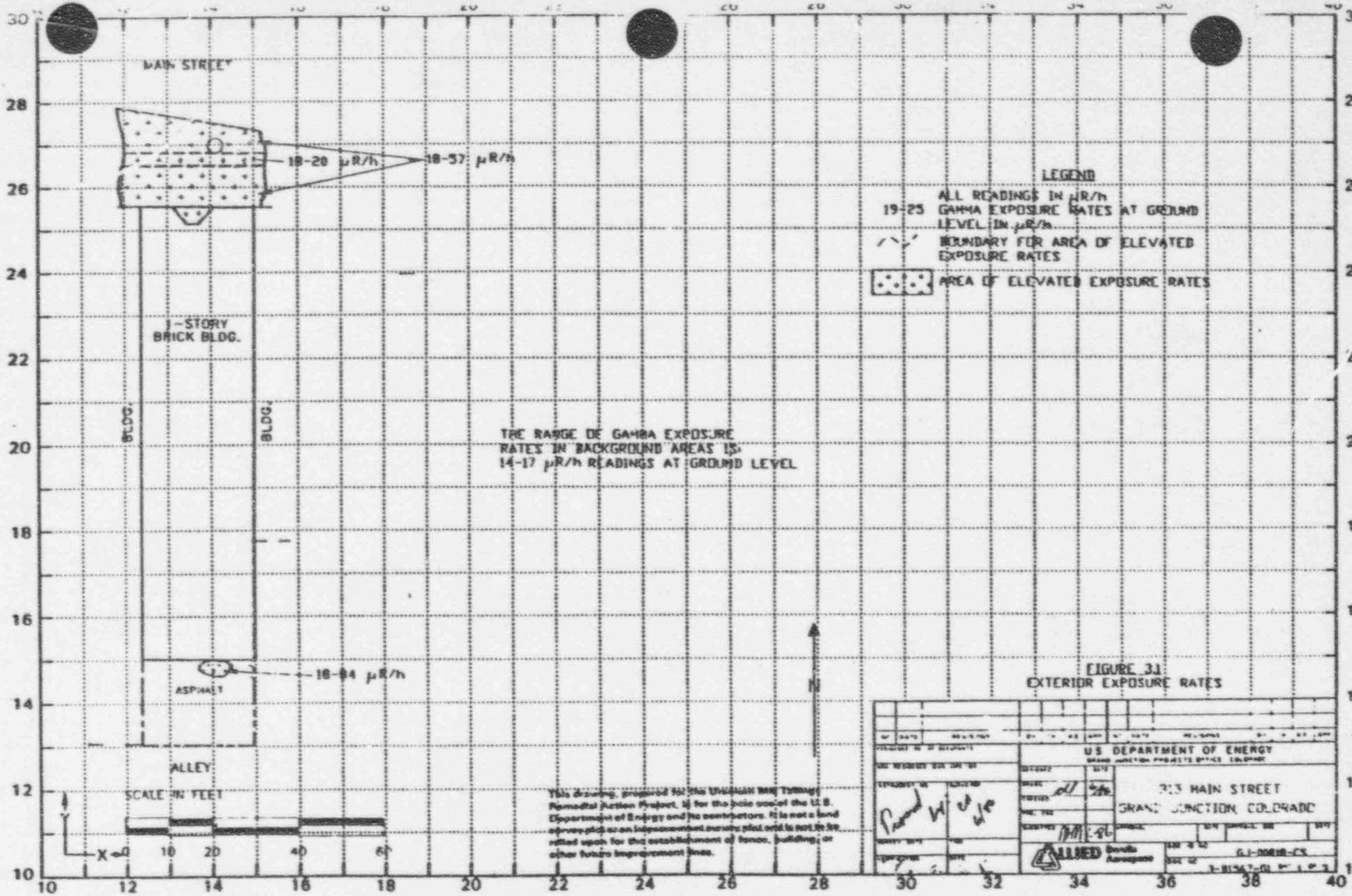


FIGURE 31
EXTERIOR EXPOSURE RATES

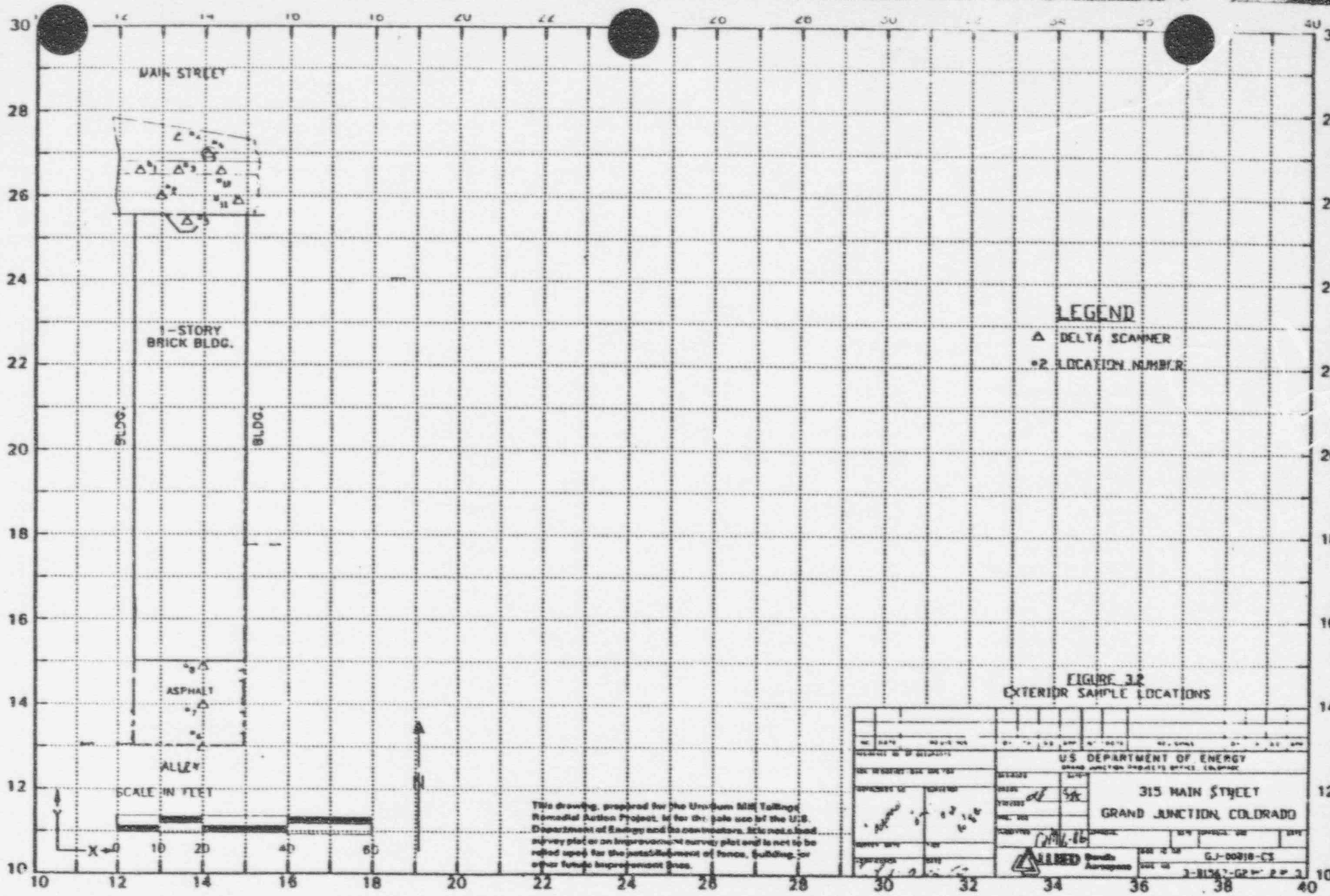


FIGURE 3.2
EXTERIOR SAMPLE LOCATIONS

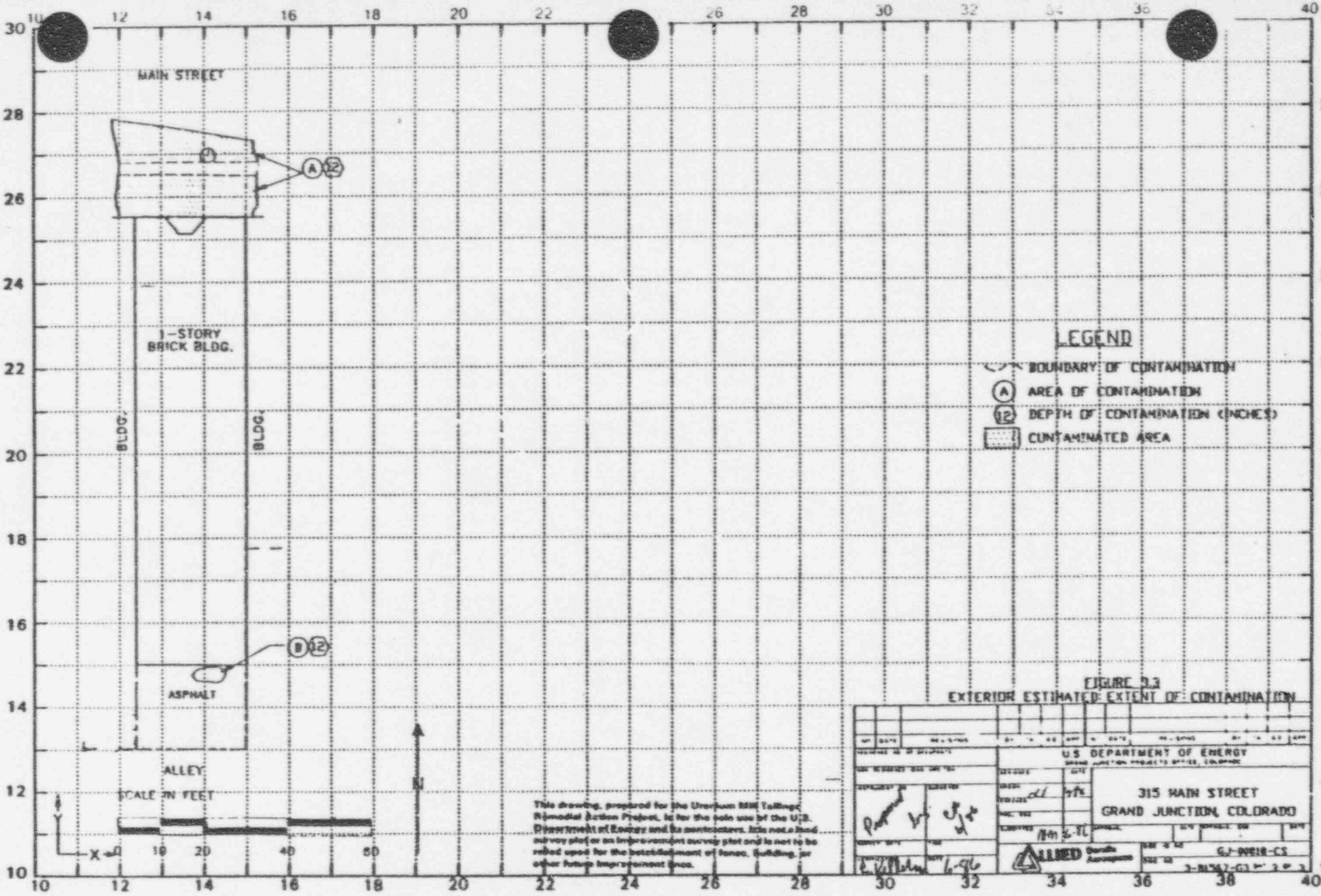
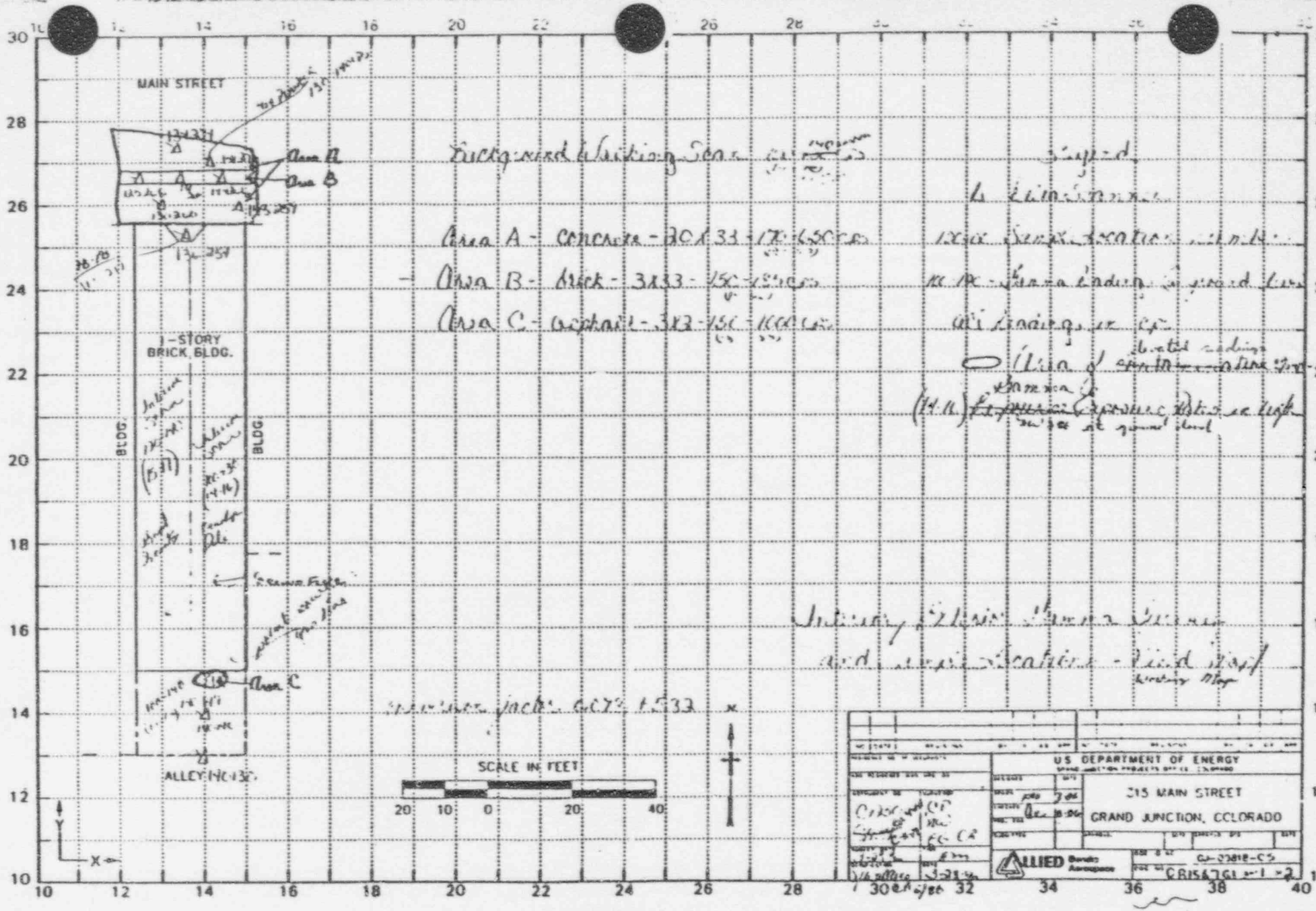


FIGURE 3.3
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION


MAIN STREET
Area A
Area B
Area C
1-STORY BRICK BLDG.
BLDG.
BLDG.
ALLEY
SCALE IN FEET
20 10 0 20 40
US DEPARTMENT OF ENERGY
215 MAIN STREET
GRAND JUNCTION, COLORADO
ALLIED Bendix Aerospace

<860417.1117>

Summary of Short Form Radiologic Assessment Data

The radiologic assessment of this property has been performed according to the GRJVP Radiologic Support Operations Procedures Manual, Section 24 (draft). The assessment data collected on this property was analyzed and determined to be in excess of the Environmental Protection Agency (EPA) criteria as set forth in the 'Standards for Remedial Action at Inactive Uranium Processing Sites' (40 CFR 192).

Radiologic data collected by Bendix at DOE ID No. GJ-00821-CS on March 21, 1986, confirmed the presence of contamination in excess of EPA standards. The total area of contamination found by the Bendix survey is shown in Figure 1. Locations of radium concentration measurements from the Bendix survey are shown in Figure 2.

EXTERIOR FINDINGS

Area Background: 15 uR/h

INTERIOR FINDINGS

Area Background: 14 uR/h
Exposure Rates in Habitable Areas Range from:
14 to 15 uR/h

Raduim concentration measurements are presented in Table 1.

Additional information pertinent to this property is discussed in the Team Leader Notes.

MEMORANDUM

ALLIED Bendix
Aerospace

Bendix Field Engineering Corporation
Grand Junction Operations
Grand Junction, Colorado

Date: March 21, 1986

To: Files

From: Penny Weeks

Subject: Team Leader Notes - GJ-00821-CS

FAST-TRACK

Address: 319 Main Street

Owner: Roland A. Raso/Colorado Copy Center

Weather: Warm and sunny

Arrival Time: 12:00 PM

Team Members

P. Weeks (Team Leader)
C. Hardy
S. Garcia
C. DeCrow

Instruments

See Operational Equipment Summary sheet

Oak Ridge National Laboratory (ORNL) data indicates contamination associated with the city sidewalk, in addition to an isolated deposit along the east property line in the south lot.

The Bendix survey confirms their findings. The isolated deposit was delta scanned, no contamination was detected.

A delta scan was performed on the exterior wall of the east adjacent property. The exterior wall has a stucco siding, which is apparently contaminated. This area will not be called for removal due to the fact that it is on the adjacent property. A spectrometer was not available at the time of the survey, therefore no spectrometer reading was performed on this wall.

No utility lines were located or investigated. There was no water meter pit to obtain readings from.

No footing/foundation was necessary.

The background range is 14 to 16 uR/h. No grid point readings were performed because of the entire property being concrete or asphalt.

Spillover data will not be collected on the properties to the east (DOE ID GJ-00818-CS) and west (DOE ID GJ-000824-CS), since spillover consists of a city sidewalk.

The working level (WL) has not been determined by either the Colorado Department of Health (CDH) or Bendix.

No problems were encountered while on the property.

The property was restored to pre-survey condition.

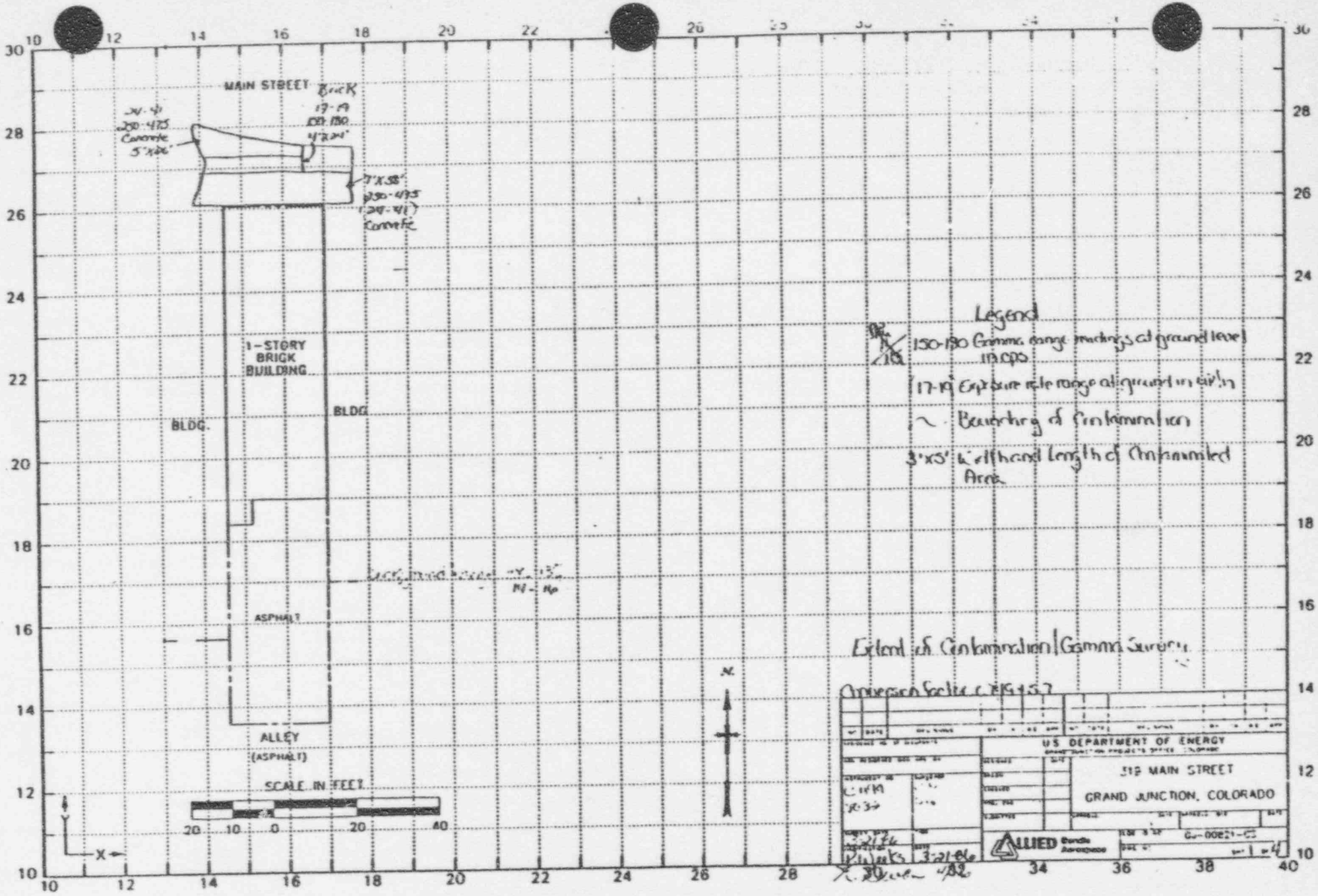
Departure time: 1:30 PM

pa
RADRPT V4.1 <860317.1503> Table 1
Radium Concentrations at Exterior Locations
[redacted] #GJ-00821-CS 319 Main Street Page 1 of 1

Loc #	Grid Location	Depth (in.)	Meas. Type	In Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
1	149264	00	DS	48.6		*	Sidewalk
2	149271	00	DS	<1.0		*	Decorative sidewalk
3	149277	00	DS	17.9		*	Sidewalk
4	169170	00	DS	1.6		*	East property line
5	169264	00	DS	26.1		*	Sidewalk
6	169271	00	DS	<1.0		*	Decorative sidewalk
7	169274	00	DS	<1.0		*	
8	170175	[65]	DS	30.5		*	On adjacent building

surement DS = Delta Scintillometer

Notes: DC = Depth of Contamination
* = No Soil Sample Taken
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 03-21-86
Team Leader = PW


MAIN STREET
Brick
1-STORY BRICK BUILDING
BLDG.
BLDG
ASPHALT
ALLEY (ASPHALT)
SCALE IN FEET
20 10 0 20 40
X
Y
N
Legend
150-180 Gamma range readings at ground level
17-19 Exposure rate range at ground surface
Boundary of Contamination
3'x5' Width and Length of Contaminated Area
Extent of Contamination/Gamma Survey
US DEPARTMENT OF ENERGY
517 MAIN STREET
GRAND JUNCTION, COLORADO
ALLIED Bendix Aerospace

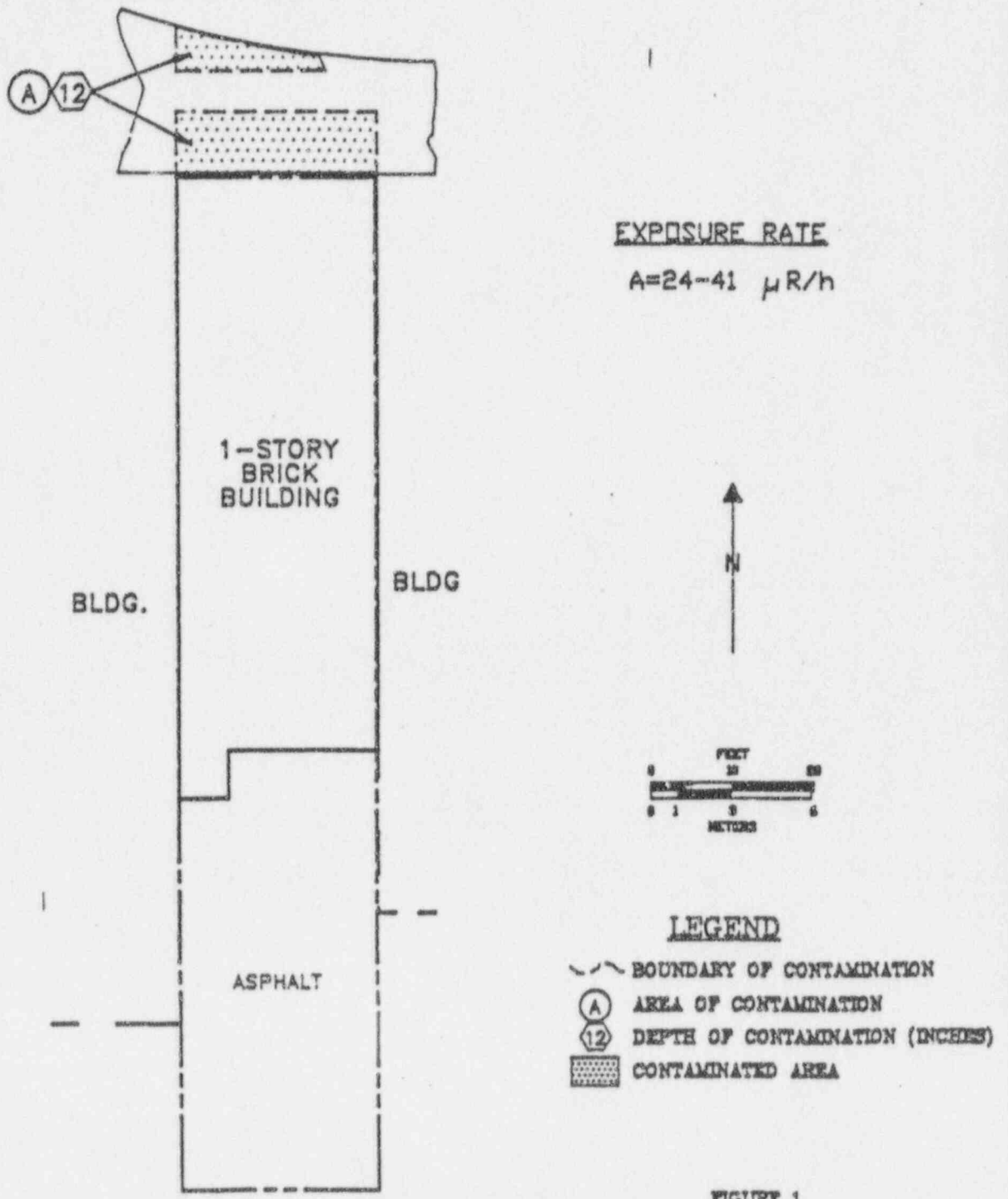


FIGURE 1
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION / EXPOSURE RA

319 MAIN STREET
GRAND JUNCTION, COLORADO

ALLIED

GJ-00821-CS

This drawing prepared for the Uranium Mill Tailings Remedial Action Project is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plat or an improvement survey plat and is not to be relied upon for the establishment of fence, building, or other future improvement lines.

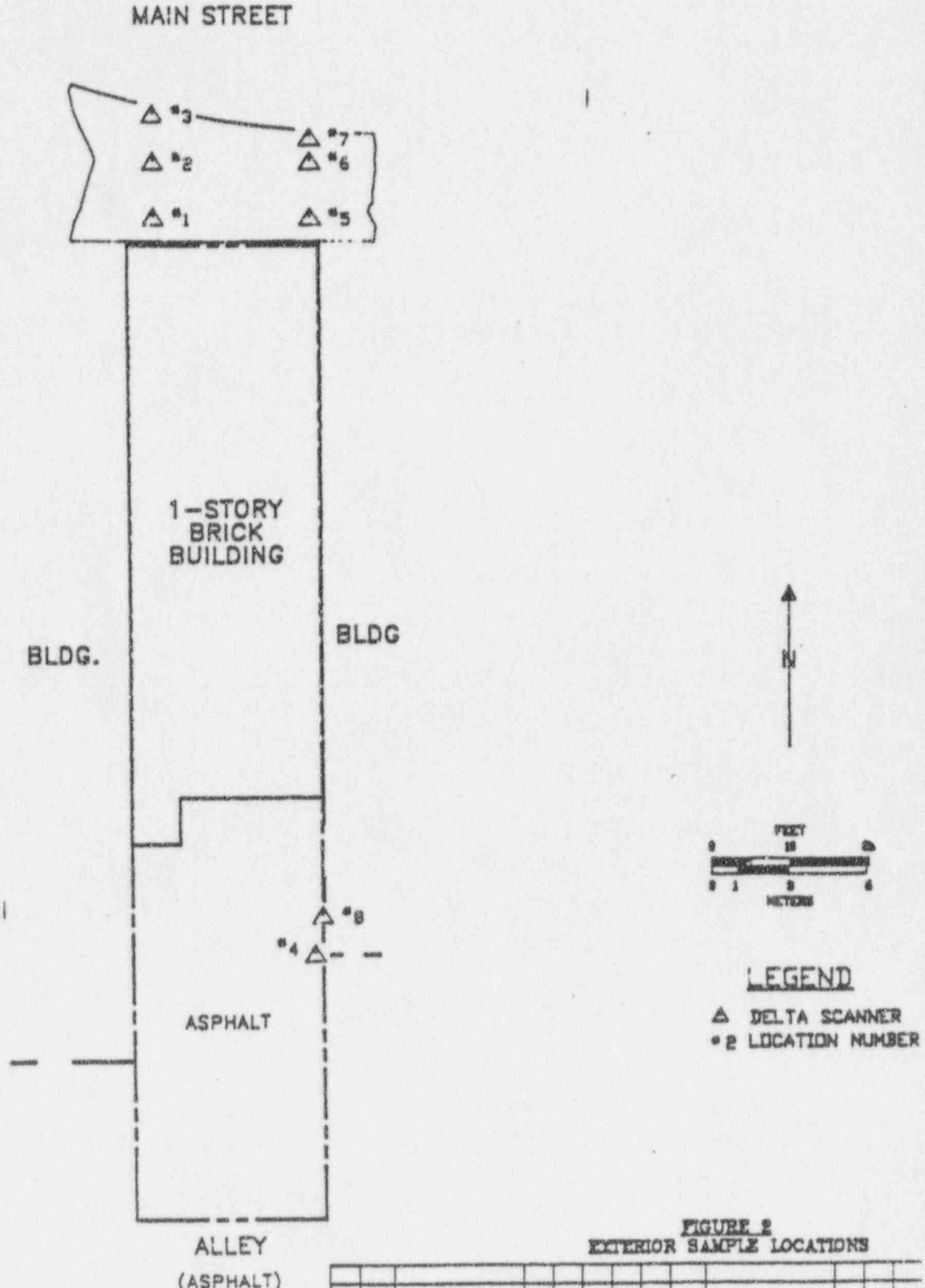


FIGURE 2
EXTERIOR SAMPLE LOCATIONS

Prepared by P.Wick 4/2/86

BL 4/86

319 MAIN STREET
GRAND JUNCTION, COLORADO

ALLIED

GJ-00821-CS
2 of 2

This drawing prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plat or an improvement survey plat and is not to be relied upon for the establishment of fence, building, or other future improvement lines.

3.0 RADIOLOGIC SURVEY

3.1 Introduction

Radiologic assessment data were collected by UNC at DOE ID No. GJ-00824-CS on March 6, 1987. Data collection methods were performed in accordance with procedures fully described in the Radiologic Support Operations Procedures Manual GJ-07(86) (Bendix Field Engineering Corporation, 1986). These data were evaluated to determine the areal and vertical extent of uranium mill tailings contamination at this property as well as any other contaminated material that may have originated from the millsite. The assessment data collected on this property were analyzed and determined to be in excess of the Environmental Protection Agency (EPA) criteria as set forth in the "Standards for Remedial Action at Inactive Uranium Processing Sites" (40 CFR 192).

A review of the historical information available for this property was conducted to determine the areas of potential contamination identified during previous radiologic assessments.

3.2 Gamma Exposure-Rate Surveys

3.2.1 Exterior Findings

Area Background: Undetermined
Gamma Exposure Rates Range from: 15 to 41 uR/h

Exterior gamma exposure-rate survey results are shown in Appendix Figure 3.1.

3.2.2 Interior Findings

Area Background: 13 uR/h (ORNL)
Gamma Exposure Rates in Habitable Areas Range from:
11 to 37 uR/h (ORNL)

Interior gamma exposure-rate survey results are shown in Appendix Figure 3.2. Interior gamma exposure-rate measurements are summarized in Appendix Table 3.3.

3.3 Boreholes, Soil Samples, and Other Measurements

Area Background: Undetermined

Areas which displayed elevated gamma levels were further investigated; the locations and types of these investigations are shown in Appendix Figures 3.3a and 3.3b. Data from these investigations are included in Appendix Tables 3.1 and 3.2.

3.4 Radon/Radon Decay Product Concentration (RDC)

The RDC measurement taken by the Colorado Department of Health was determined to be 0.014 gross working level. No RDC measurements were taken by UNC.

3.5 Extent of Contamination

Appendix Figures 3.4a and 3.4b show identified areas and estimated depths of contamination on this property, based on assessments of all measurements taken. As noted in these figures, areas containing identified residual radioactive materials are:

(Area A) In-Situ Ra-226: 3.9 pCi/g
Surface Material: Fiberglass (shower stall)
Location: Mens locker room
Other Directions: Southwest corner of the building
Total Depth of Contamination: 12 inches
Other (height or thickness): 4-inch-thick concrete
Comments: This area seems to be a concrete slab that is 4 feet long by 2 feet wide, it extends about 6 inches to the exterior.

(Area B) In-Situ Ra-226: 28.0 pCi/g
Surface Material: Stucco veneer
Location: South and west walls
Other (height or thickness): The south wall is 12 feet high by 18 feet long, and the west wall is 14 feet high by 15 feet long.
Comments: This area is a brick wall with a stucco veneer.

(Area C) In-Situ Ra-226: 24.3 pCi/g
Surface Material: Concrete
Location: North of the building
Other Directions: City sidewalk
Other (height or thickness): 4-inch-thick concrete
Total Depth of Contamination: 12 inches

(Area D) In-Situ Ra-226: 3.4 pCi/g
Surface Material: Concrete
Location: Southwest corner of the building
Total Depth of Contamination: 12 inches
Other (height or thickness): 4-inch-thick concrete
Comments: This area is an extension of the concrete slab from the interior.

Additional information pertinent to this property is discussed in the Team Leader Notes.

3.6 Summary of Remedial Action Recommendations

Interior contamination in Areas A and B does not exceed the EPA criteria for removal based on gamma exposure rates or RDC levels. No remedial action should be performed. Area D, which is an exterior extension of Area A, should also remain.

Area C is an exterior tailings deposit, it should be removed to a depth of 12 inches and replaced with new concrete.

Tailings material deeper than 12 inches, and associated with the utility trenches under Area C should not be removed. Supplimental standards should be applied for.

<870408.0953>

Team Leader Notes

Survey Date: March 6, 1987

Team Leader: H. Lucero

DOE ID Number: GJ-00824-CS

Tenant: Body Talk Aerobics Telephone: (303)242-2222

The deposit located by Oak Ridge National Laboratory (ORNL) on the north side of the brick pavers was not located by UNC.

The utility lines were not located at the time of the survey.

The footing/foundation was investigated.

Due to the surface coverings of asphalt and concrete five background exposure rates and deltas could not be taken.

Contamination from this property spills over to the west and east at 319 Main Street and 359 Main Street (DOE ID No. GJ-00821) and (DOE ID No. GJ-00469), respectively. These properties have been included by ORNL.

HL:bgr

RADRPT V5.0 <870122.1616> Table 3.1
Radium Concentrations at Exterior Locations
DOE ID #GJ-00824-CS 321 Main Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In-Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
8	146205	00	DS	2.1		*	Concrete
9	146208	00	DS	12.8		*	Concrete/Spillover
10	147177	00	DS	<1.0		*	Concrete
11	149177	00	DS	1.1		*	Brick
12	149208	00	DS	1.2		*	Brick pavers
13	155178	00	DS	22.8		*	Concrete
14	155190	00	DS	20.0		*	Concrete
15	155201	00	DS	24.3		*	Concrete
16	155207	00	DS	<1.0		*	Concrete
17	159206	[06]	DS	2.2		*	Hz/Brick
		00	DS	1.1		*	Concrete
18	235179	[84]	DS	1.6		*	Hz/Stucco veneer
		[84]	GS	2.1		*	
19	243179	[36]	GS	22.5		*	Stucco veneer
		[24]	DS	28.0		*	Hz/Stucco wall
		00	DS	1.8		*	Asphalt
20	251184	[30]	DS	27.9		*	Hz/Stucco veneer
		[30]	GS	23.2		*	
21	251188	[92]	DS	25.4		*	Hz/Stucco veneer
		[92]	GS	20.9		*	
		[36]	GS	5.1		*	
		[08]	DS	1.4		*	Hz/On stucco wall
22	252181	[16]	DS	27.6		*	Hz/On stucco wall
		00	DS	3.4		*	Asphalt/Elect lines
23	252193	00	DS	1.5		*	Concrete
24	255198	[64]	DS	1.4		*	Hz/Stucco veneer
		[64]	GS	2.3		*	

RADRPT V5.0 <870122.1616> Table 3.1

Radium Concentrations at Exterior Locations

DOE ID #GJ-00824-CS 321 Main Street

				In-Situ Ra-226 (pCi/g)			
Loc #	Grid Location	Depth (in.)	Meas. Type	Non-Deconv.	Deconv.	Chem.	Comments
25	260190	00	DS	<1.0		*	Asphalt
26	270190	00	DS	1.6		*	Asphalt

Measurement Types:
- GB = GAD-6 Borehole
- GS = GAD-6 Surface
- DS = Delta Scintillometer
- TC = Total Count Borehole
- SS = Soil Sample
- DH = Downhole Scintillometer

Notes:
- DC = Depth of Contamination
- * = No Soil Sample Taken
- [n] = Reading Taken n-Inches Above Floor or Ground
- Date of Survey = 03-06-87
- Team Leader = HL

RADRPT V5.0 <870122.1616> Table 3.2

Radium Concentrations at Interior Locations

DOE ID #GJ-00824-CS 321 Main Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In-Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
1	310226	00	DS	1.8		*	Concrete
2	310235	00	DS	1.2		*	Concrete
3	320215	00	DS	1.3		*	Concrete
4	347208	00	DS	2.0		*	Concrete
5	350235	00	DS	<1.0		*	Concrete
6	355211	00	DS	1.9		*	Shower stall/Fbrglss
7	356208	00	DS	3.9		*	Shower stall/Fbrglss

Measurement Types:
GB = GAD-6 Borehole
GS = GAD-6 Surface
DS = Delta Scintillometer
TC = Total Count Borehole
SS = Soil Sample
DH = Downhole Scintillometer

Notes:
DC = Depth of Contamination
* = No Soil Sample Taken
[n] = Reading Taken n-Inches Above Floor or Ground
Date of Survey = 03-06-87
Team Leader = EL

Table 3.3
Summary of Interior Gamma Exposure Rates

DOE ID No. GJ-00824-CS 321 Main Street

Location	Number of Readings Taken at Waist Level	Range at Waist Level (uR/h)	Mean at Waist Level (uR/h)	Number of Readings Taken at Surface	Range at Surface (uR/h)	Mean Surface (uR/h)
Region 1 Ground Floor	**	**	**	**	11-14	**
Region 2 Ground Floor	**	**	**	**	20-24	**
Region 3 Ground Floor	**	**	**	**	30-37	**
Region 4 Ground Floor	**	**	**	**	14-17	**

** A walking gamma scan was performed by ORNL to characterize the interior.

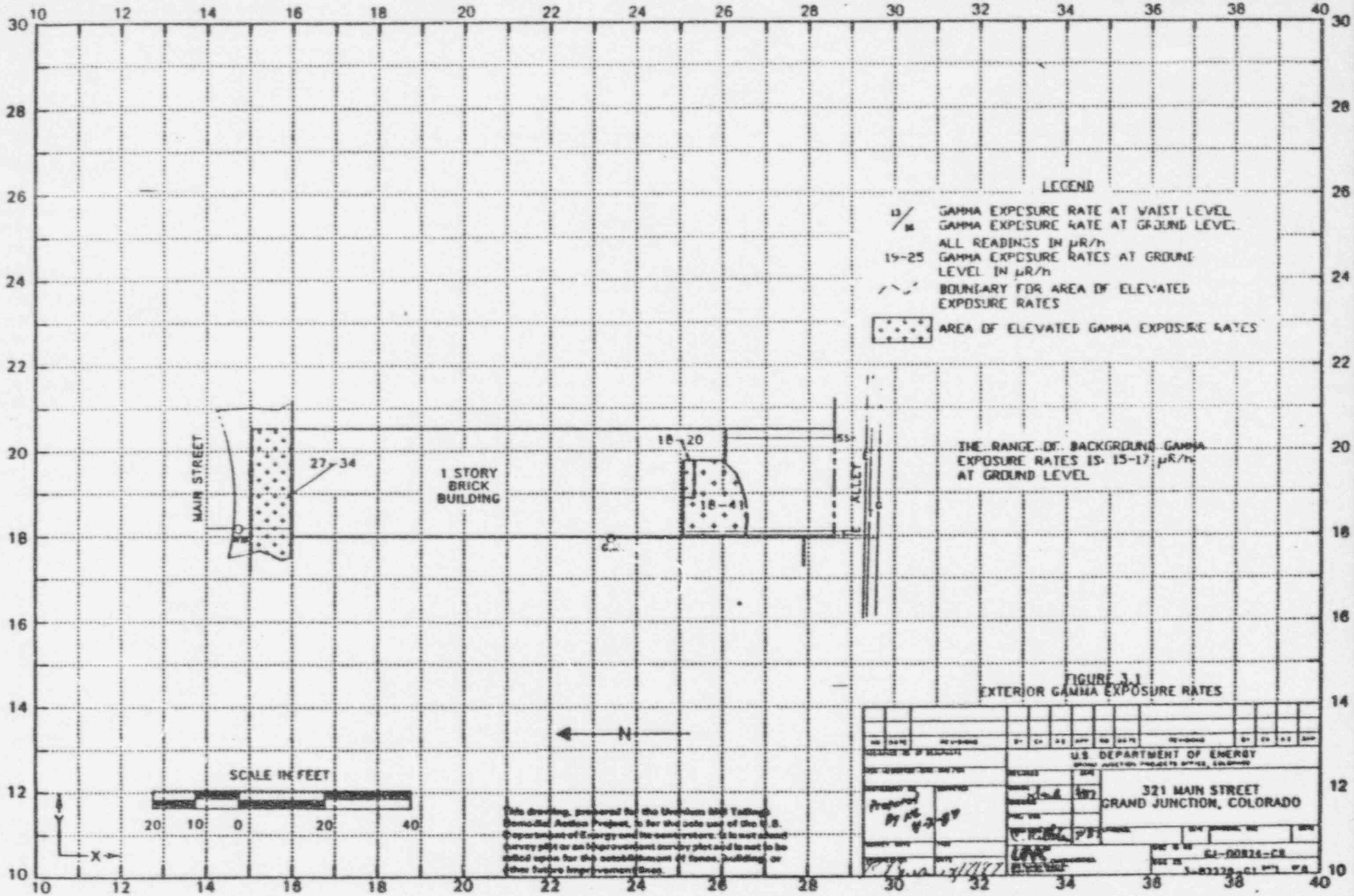


FIGURE 3.1
EXTERIOR GAMMA EXPOSURE RATES

This drawing, prepared for the Uranium Mill Tailings Remedial Action Project, is for the sole use of the U.S. Department of Energy and its contractors. It is not a land survey plat or an improvement survey plat and is not to be relied upon for the establishment of fence, building, or other future improvement lines.

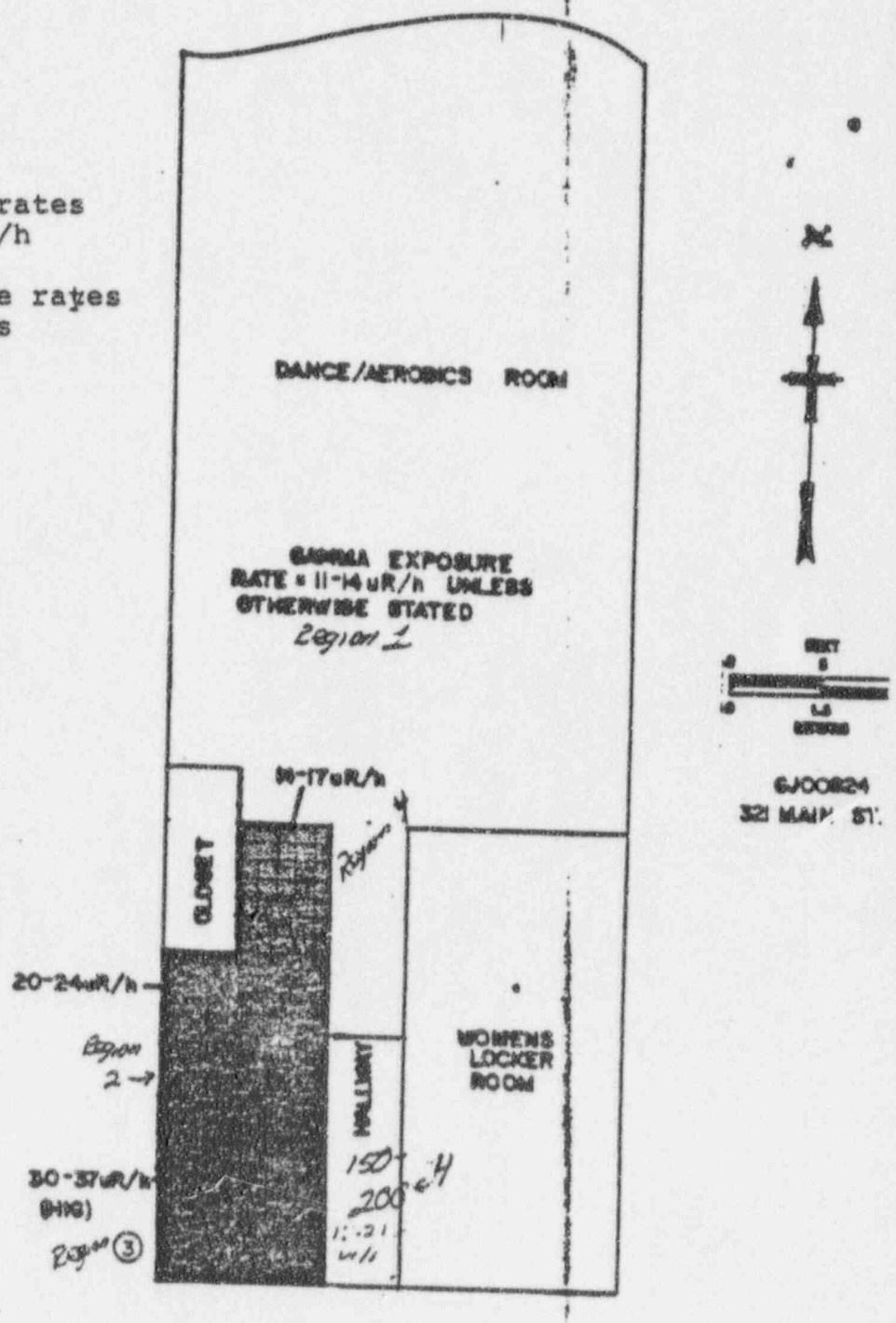
Appendix Figure 3.2

Ground Floor

12-15 Gamma exposure rates at ground level in uR/h

120-130 Gamma exposure rates at ground level in cps

① Region of elevated exposure rates



C-1167

Figure 1b. Location GJ00824 - 321 Main Street, Grand Junction, C (ind. a).

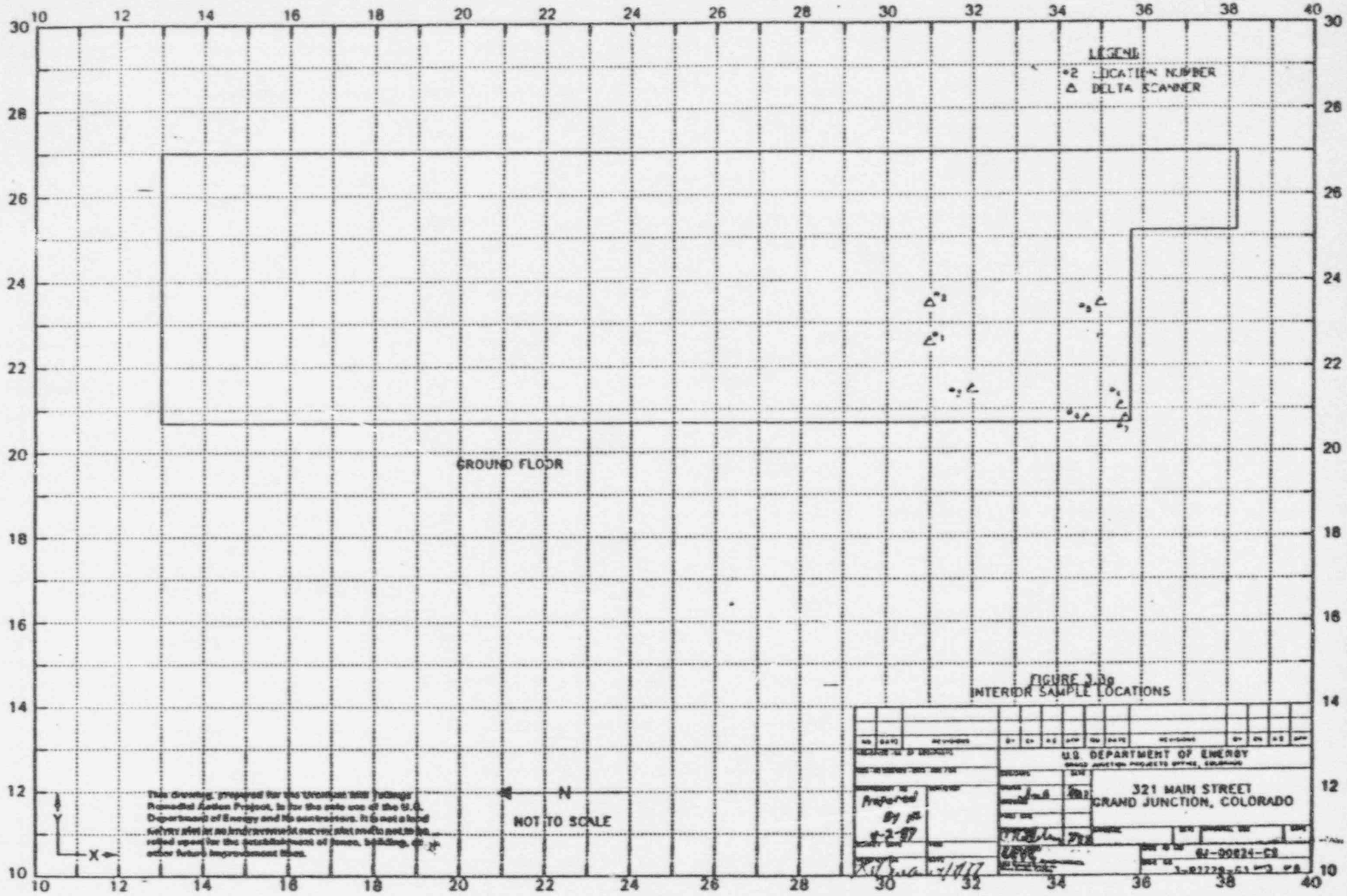


FIGURE 3.3a
INTERIOR SAMPLE LOCATIONS

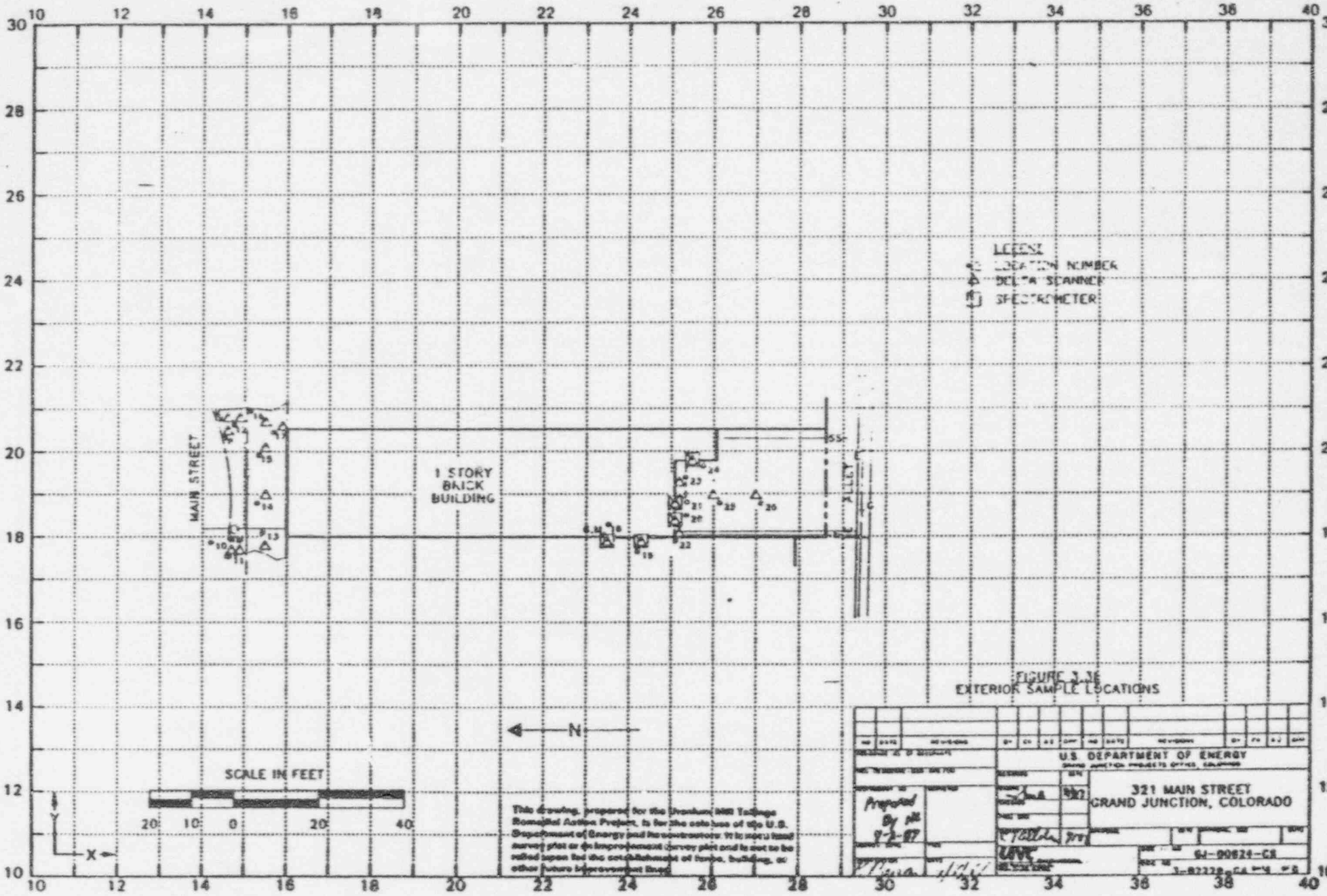


FIGURE 3.16
EXTERIOR SAMPLE LOCATIONS

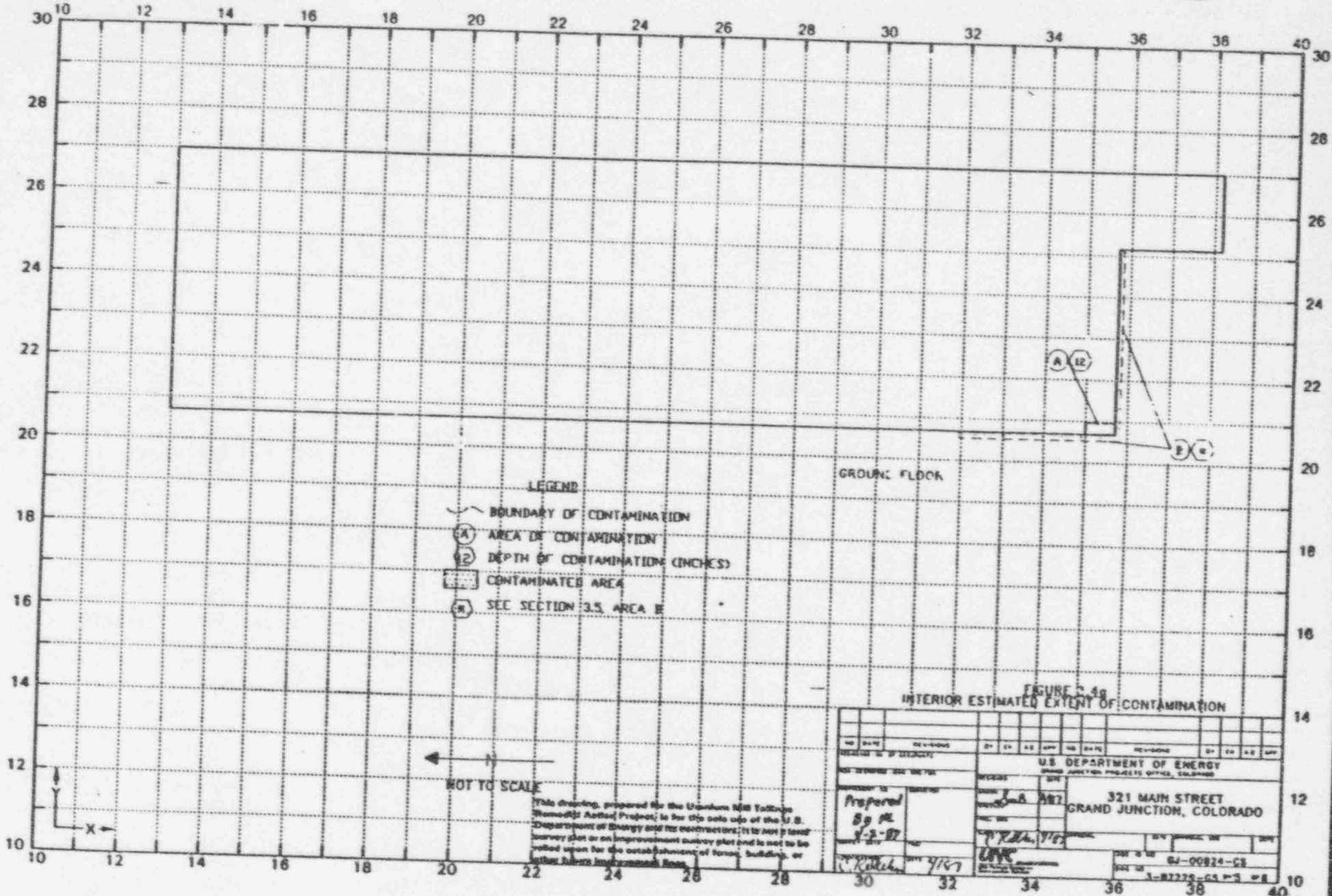


FIGURE 5.4a
INTERIOR ESTIMATED EXTENT OF CONTAMINATION

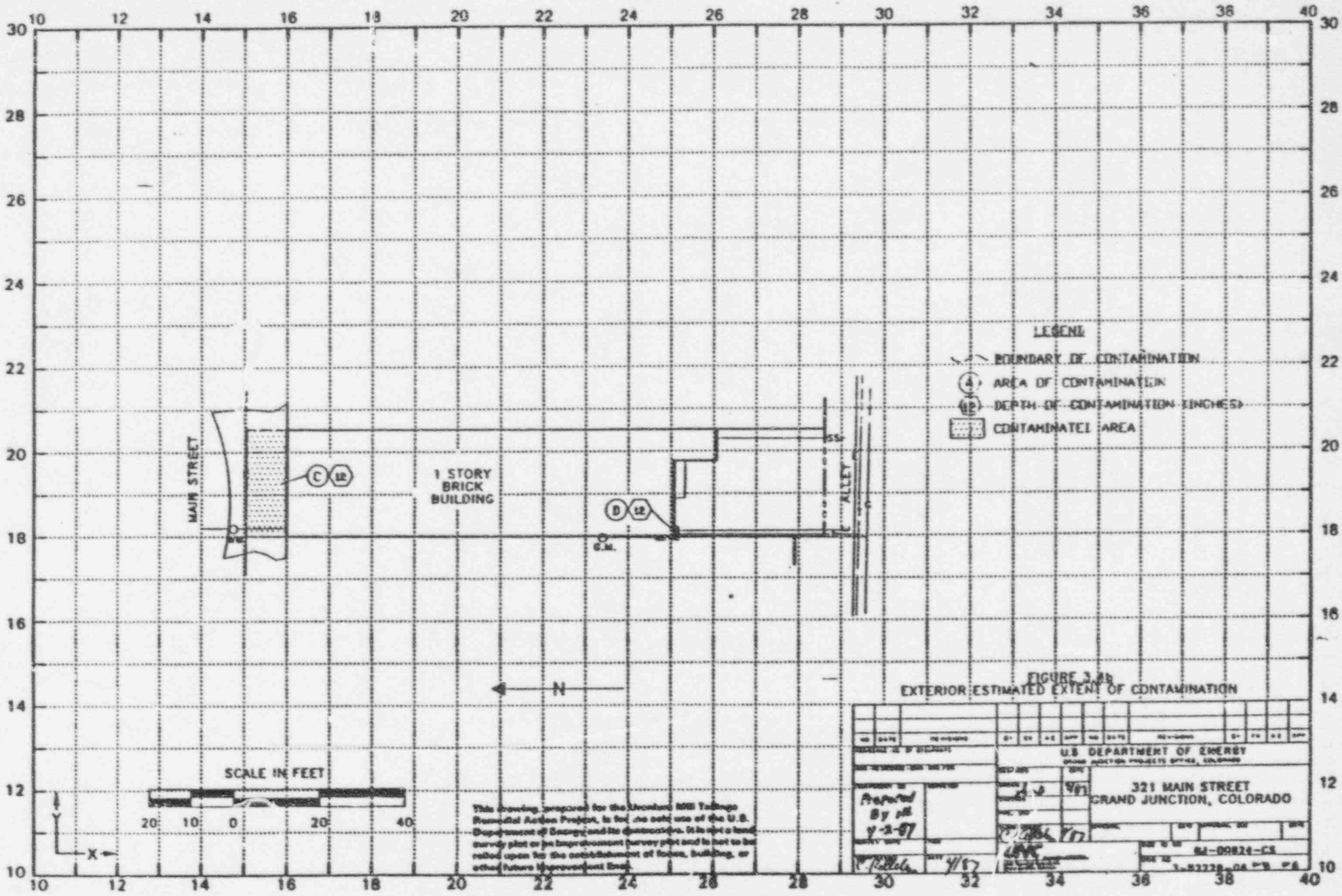


FIGURE 3.48
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION

APPENDIX A

RADIOLOGICAL ASSESSMENT FOR DOE ID No. GJ-00469-CS and GJ-00822-CS

CONTENTS

EXECUTIVE SUMMARY

1.0 INTRODUCTION

This property is a commerical structure, located at 327 and 359 Main Street.

Data were collected using procedures described in the Radiologic Support Operations Procedures Manual. Data collected on this property were assessed to estimate the location of residual radioactive material in excess of the Environmental Protection Agency (EPA) 'Standards for Remedial Action at Inactive Uranium Processing Sites' (40 CFR 192).

This property has been included for remedial action consideration by DOE historical data review on the basis of excess radium-226 concentration in land area.

2.0 GAMMA EXPOSURE-RATE SURVEYS

2.1 Exterior

Background range is 15 to 16 uR/h.
Gamma exposure rates range from 15 to 32 uR/h.
Exterior gamma exposure-rate survey results are shown in Figure 1.

2.2 Interior

Area background determined by UNC is 15 uR/h. Gamma exposure rates in the habitable area range from 14 to 16 uR/h.

3.0 RADON/RADON DECAY PRODUCT CONCENTRATION (RDC)

No RDC measurements were taken by UNC or CDH.

4.0 EXTENT OF CONTAMINATION

4.1 Exterior

Accumulated data indicate spill-over contamination onto the property adjoining the west side of this property. The DOE ID number of the spillover is GJ-00824-CS.

Figure 2 shows the location and types of explorations and radium measurements made, and related radium data are listed in Table 1. Estimated radium concentrations range from 2.2 to 20.6 pCi/g in the contaminated areas.

Figure 3 shows the estimated boundaries and depths of exterior contamination. There are two separate deposits containing identified residual radioactive materials that are characterized as follows:

In the concrete aggregate of and/or beneath the sidewalks.

4.2 Interior

There is no evidence of interior residual radioactive material at this property.

5.0 REMEDIAL ACTION RECOMMENDATIONS

5.1 Exterior

Referencing Figure 3, exterior Areas A and B should be removed and the appropriate cover material should be replaced. Spillover contamination on the property adjoining the west side should be removed as part of this remedial action.

5.2 Interior

None

DOE ID No. GJ-00469-CS and GJ-00822-CS

Team Leader Notes

Survey Date: March 19, 1987

Team Leader: Steve Garcia

DOE ID Number: GJ-00469-CS and GJ-00822-CS

None of the utility lines were investigated because the ground covering is concrete.

Contamination from this property spills over to the west at (DOE ID No. GJ-00824-CS), 321 Main Street. This property has been included by Oak Ridge National Laboratory (ORNL).

Elevated readings around the structure were found to be readings from the brick walls on the buildings.

SG:bgr

RADRPT V5.0 <870122.1616> Table 1

Radium Concentrations at Exterior Locations

DOE ID #GJ-00469-CS 359 Main Street

GJ-00822-CS 327 Main Street

Loc #	Grid Location	Depth (in.)	Meas. Type	In-Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
1	160330	00	DS	1.3		*	Concrete
2	168340	00	DS	1.8		*	Red concrete/West pour
		00	DS	3.0		*	East pour
3	172340	00	DS	1.9		*	Red concrete
4	180330	00	DS	1.5		*	Concrete
5	180356	00	DS	7.6		*	
6	208362	00	DS	20.6		*	
7	210275	00	DS	<1.0		*	In planter/Dirt
8	210330	00	DS	1.2		*	Concrete
9	215225	00	DS	1.5		*	Concrete
10	215305	00	DS	1.2		*	Concrete
11	252341	00	DS	2.2		*	West pour
		00	DS	1.9		*	South pour
		00	DS	7.7		*	East pour
12	290330	00	DS	<1.0		*	Concrete
13	290340	00	DS	17.4		*	Concrete
		00	DS	1.7		*	Red concrete
14	340330	00	DS	<1.0		*	Concrete
15	340340	00	DS	<1.0		*	Red concrete
		00	DS	12.6		*	Concrete
16	350300	00	DS	<1.0		*	Tile walk
17	350380	00	DS	1.6		*	East pour
		00	DS	9.3		*	Concrete/West pour
18	360320	00	DS	1.1		*	Concrete
19	368294	00	DS	1.7		*	Tile walk

RADRPT V5.0 <870122.1616> Table 1

Radium Concentrations at Exterior Locations

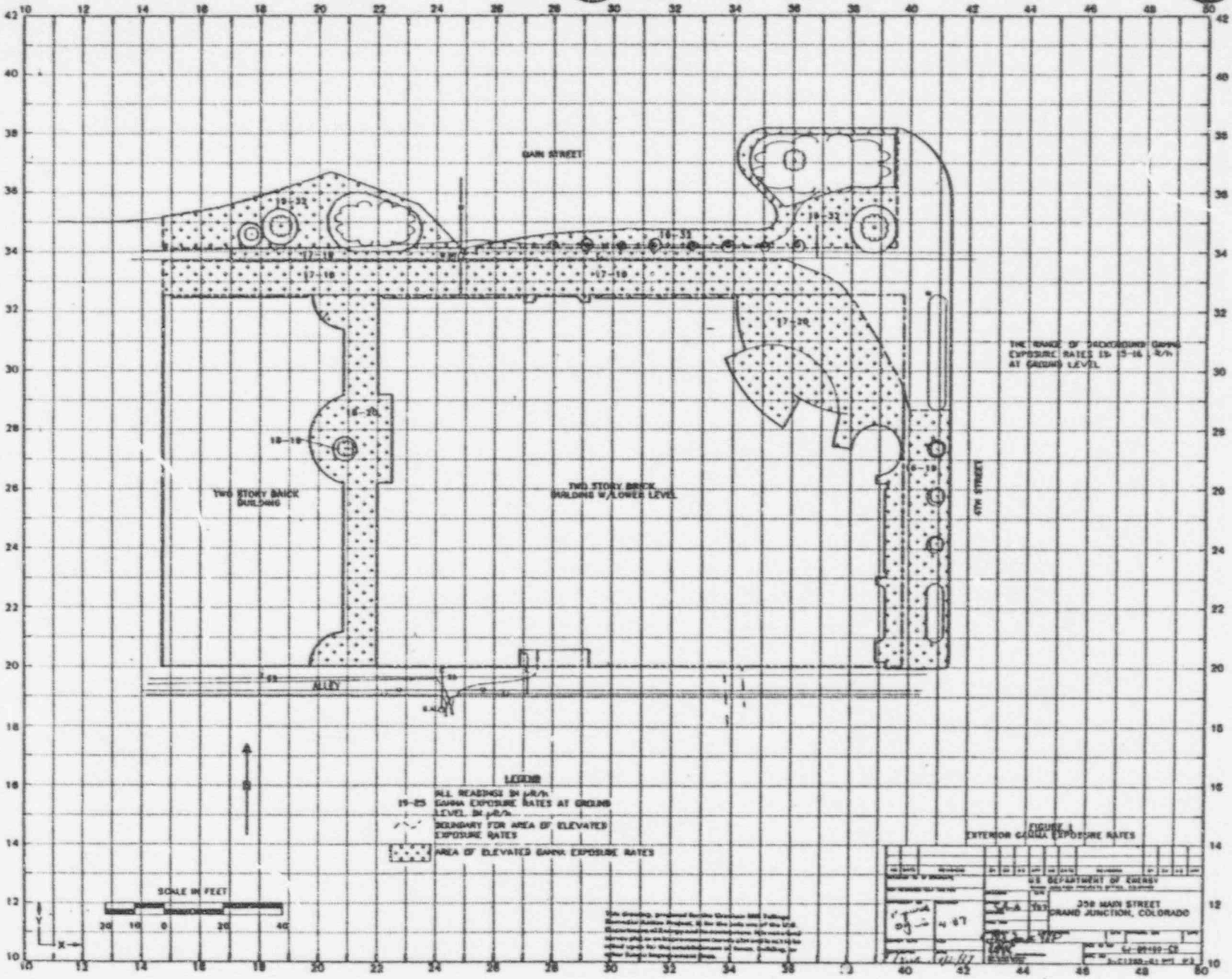
DOE ID #GJ-00469-CS 359 Main Street

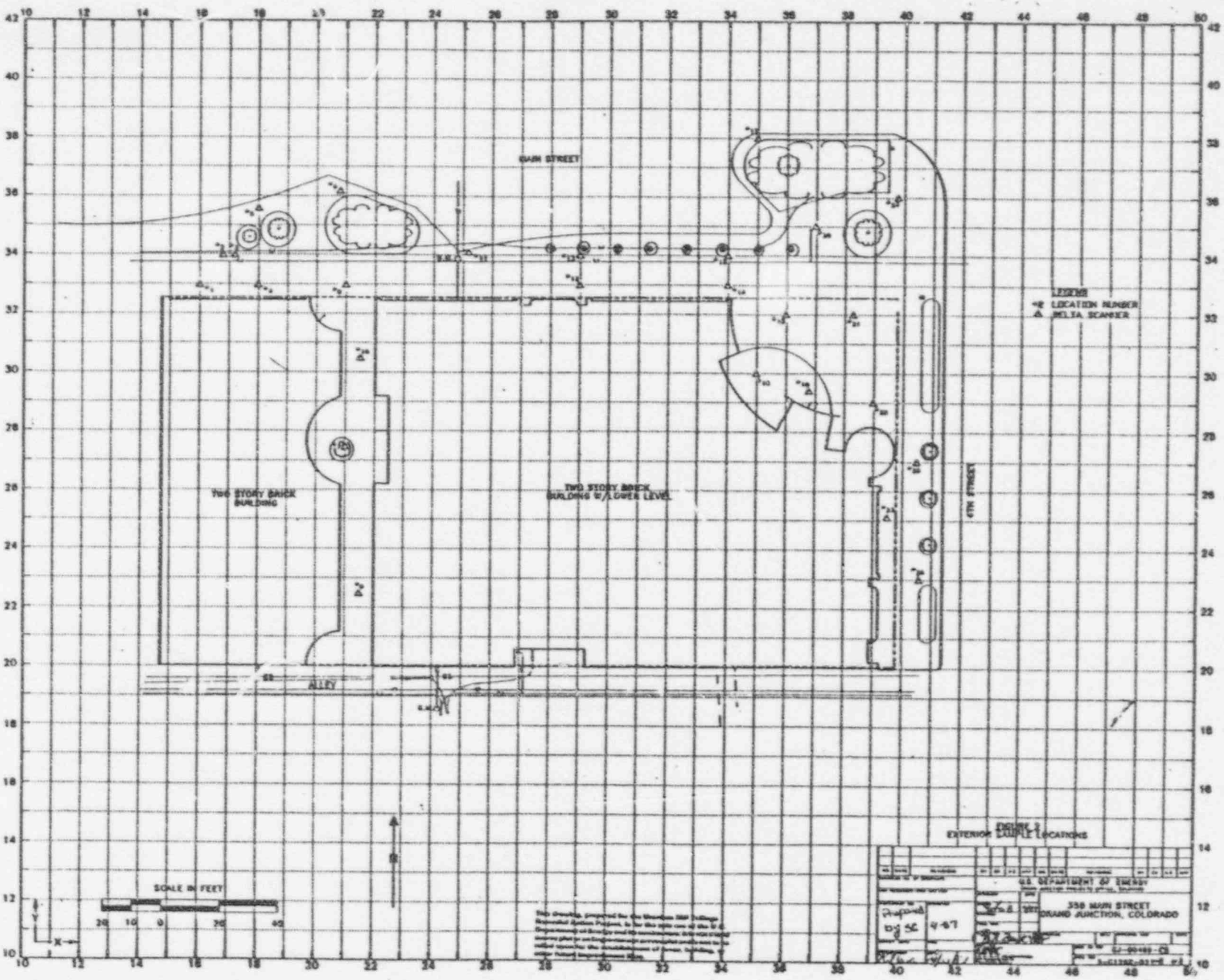
GJ-00822-CS 327 Main Street

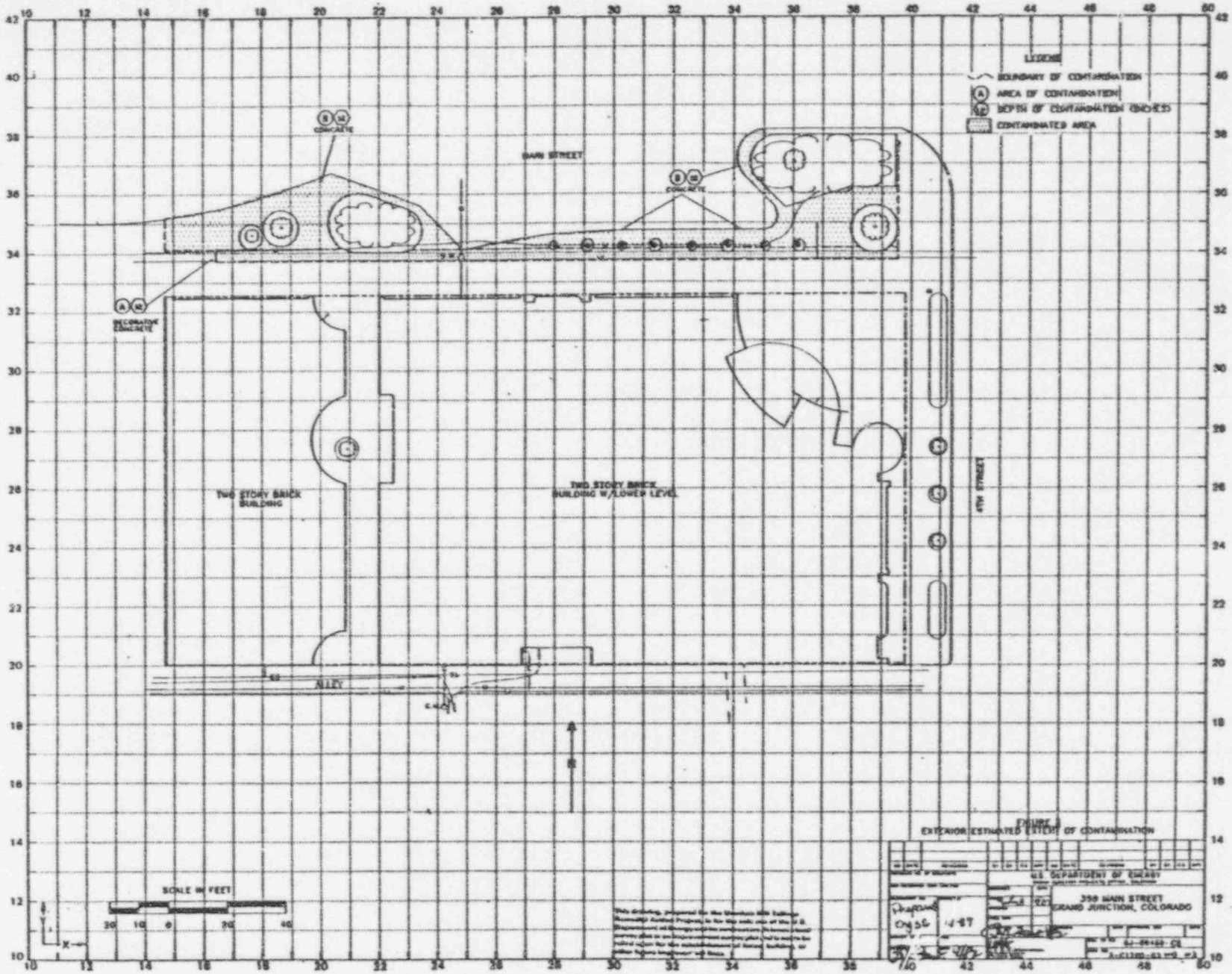
Loc #	Grid Location	Depth (in.)	Meas. Type	In-Situ Ra-226 (pCi/g) Non-Deconv.	Deconv.	Chem.	Comments
20	370350	00	DS	4.5		*	Adjacent lamp
21	383320	00	DS	1.2		*	West pour
		00	DS	1.1		*	East pour
22	390290	00	DS	1.3		*	Concrete
23	395251	00	DS	1.2		*	Concrete
24	398360	00	DS	14.8		*	West pour
		00	DS	1.5		*	
25	405270	00	DS	1.6		*	
26	406230	00	DS	1.5		*	

Measurement Types:
- GB = GAD-6 Borehole
- GS = GAD-6 Surface
- DS = Delta Scintillometer
- TC = Total Count Borehole
- SS = Soil Sample
- DH = Downhole Scintillometer

Notes:
- DC = Depth of Contamination
- * = No Soil Sample Taken
- [n] = Reading Taken n-Inches Above Floor or Ground
- Date of Survey = 03-19-87
- Team Leader = SG


MAIN STREET
4TH STREET
ALLEY
TWO STORY BRICK BUILDING
TWO STORY BRICK BUILDING W/LOWER LEVEL
THE RANGE OF BACKGROUND GAMMA EXPOSURE RATES IS 15-16 μR/h AT GROUND LEVEL
LEGEND
19-25 ALL READINGS IN μR/h GAMMA EXPOSURE RATES AT GROUND LEVEL IN μR/h
BOUNDARY FOR AREA OF ELEVATED EXPOSURE RATES
AREA OF ELEVATED GAMMA EXPOSURE RATES
SCALE IN FEET
20 10 0 20 40
N
FIGURE 4
EXTERIOR GAMMA EXPOSURE RATES
U.S. DEPARTMENT OF ENERGY
350 MAIN STREET
GRAND JUNCTION, COLORADO


MAIN STREET
4TH STREET
ALLEY
TWO STORY BRICK BUILDING
TWO STORY BRICK BUILDING W/LOWER LEVEL
LEGEND
LOCATION NUMBER
DELTA SCANNER
SCALE IN FEET
DELTA 3
EXTERIOR LAPPLE LOCATIONS
U.S. DEPARTMENT OF ENERGY
350 MAIN STREET
GRAND JUNCTION, COLORADO


LEGEND
BOUNDARY OF CONTAMINATION
AREA OF CONTAMINATION
DEPTH OF CONTAMINATION (INCHES)
CONTAMINATED AREA
MAIN STREET
CONCRETE
DECORATIVE CONCRETE
TWO STORY BRICK BUILDING
TWO STORY BRICK BUILDING W/LOWER LEVEL
ALLEY
4TH STREET
SCALE IN FEET
20 10 0 20 40
N
EXTERIOR ESTIMATED EXTENT OF CONTAMINATION
U.S. DEPARTMENT OF ENERGY
359 MAIN STREET
GRAND JUNCTION, COLORADO

APPENDIX B

APPLICATION FOR SUPPLEMENTAL STANDARDS
DOE ID NO. GJ-97002-OT - PHASE II

TABLE OF CONTENTS

B.1 Applicable EPA Criteria

Application for Supplemental Standards is in accordance with the regulations set by the Environmental Protection Agency (EPA) in 40 CFR 192. The potential and applicable criteria as stated in 40 CFR 192.21 are as follows:

_____ a) Risk of injury to workers or public

_____ b) Environmental harm

__X__ c) High cost of cleaning up land relative to long-term benefits

_____ d) High cost of cleaning up building relative to benefits

_____ e) No known remedial action

_____ f) Radionuclides other than Ra-226 exist

An "X" indicates the appropriate subsection(s) for this Application.

B.2 Introduction

B.2.1 Historical Data

The Grand Junction Main Street Shopping Park was inaugurated May 18, 1963. Three years of planning were followed by a year of construction in which four blocks of Main Street, from Third Street to Seventh Street, were excavated and rebuilt with a serpentine street alignment. Raised brick planters, a fountain, kiosks, special street lights, and sculptures were installed as part of "Operation Foresight" with the goal of making Main Street the "vibrant heart of a vibrant community". The Shopping Park concept was considered extremely innovative during the early 1960s. This project has received several awards and has attracted national attention. Uranium mill tailings were used as backfill under the streets, sidewalks, and planters along Main Street. The trees and plantings have matured over the past 25 years and have become aesthetically attractive.

Known underground utility lines are shown on enclosed Drawing Number 3-D97002-F2, except for street and signal light electric service and irrigation lines. In summary, the following underground utilities are subject to potential disturbance if remedial action is performed within the Phase II area:

- A water main along the north side of Phase II.
- Numerous building water service lines along both sides of Main Street.

- The main electrical feed for street lights and traffic signals on both sides of Main Street.
- Electrical service lines from the main feed line to individual street lights and traffic signals.
- Storm drainage piping and inlets on both sides of Main Street.
- Underground irrigation piping, valves, and sprinkler heads.

B.2.2 Land Use

Land use along and around the Phase II area is comprised of typical downtown retail, commercial, entertainment, and office facilities. The Phase II area is City owned street and sidewalk right-of-way. The following conditions are applicable within the Phase II area:

	YES	NO
1. Open land	X	
2. Occupied building(s)		X
3. Contaminated areas beneath, or within 10 feet of, the building(s)		X
4. Anticipated change of land use within the foreseeable future		X
5. A health risk produced by a change in land use		X
6. Contamination in habitable areas		X
7. Owner(s) comments solicited (see attached request for comments and City of Grand Junction response and summaries of public meetings)	X	

Many of the properties adjacent to the area that is the subject of this Application for Supplemental Standards are included in the UMTRA Vicinity Property Program. Those properties and their status within the UMTRA Program are presented in Table B.T1.

B.2.3 DOE/CDH/Local Agency Input

The Department of Energy (DOE) has requested the submittal of a Supplemental Standards Application for the Main Street area. The Colorado Department of Health (CDH) has reviewed a portion of the work completed for this Application. Meetings were conducted with the City of Grand Junction staff and City Council to explain the data and evaluation of alternatives. UNC Geotech submitted a request for formal comments regarding this Application to the City of Grand Junction and a response has been received. Copies of relevant correspondence and summaries of public meeting input are attached as exhibits.

Table B.T1
300 Block of Main Street
Property Status List

DOE ID Number	Address	Status as of March 5, 1989
NORTH SIDE		
GJ-00815-CS	306 Main Street	No Action REA Approved
GJ-00817-CS	314 Main Street	Construction Complete
GJ-00819-CS	316 Main Street	No Action REA Approved
GJ-00826-CS	326 Main Street	No Action REA Approved
GJ-00828-CS	336 Main Street	REA/RAA Owner Approved
GJ-00829-CS	342 Main Street	No Action REA Approved
GJ-00833-CS	362 Main Street	REA/RAA Submitted
SOUTH SIDE		
GJ-00814-CS	307 Main Street	No Action REA Approved
GJ-00816-CS	309 Main Street	No Action REA Approved
GJ-00818-CS	315 Main Street	Construction Complete
GJ-00821-CS	319 Main Street	No Action REA Approved
GJ-00824-CS	321 Main Street	No Action REA Approved
GJ-00822-CS	327 Main Street	No Action REA Approved
GJ-00469-CS	359 Main Street	No Action REA Approved

The City of Grand Junction has expressed concern with this Supplemental Standards Application with regard to potential future liability for disposal of mill tailings deposits that are left in place.

Future liability for the disposal and migration of mill tailings is a potential problem. However, current regulations do not identify any future liabilities or responsibilities for tailings left in place by UMTRA. Therefore, this issue cannot be resolved in this submittal.

B.3 Health and Risk Analysis

Appendix A contains the radiological data that are relevant to this Application for Supplemental Standards.

B.3.1 Gamma Health Risk Analysis

The analysis of health risks related to gamma exposure is presented in Table B.T2 and contains two comparisons. The maximum gamma dose rate at waist level recommended by the International Commission on Radiological Protection (ICRP, 1977, 1978) in DOE ORDER 5940.1 (Revision 2, March 1987) is 100 mRem/year above

TABLE B.T2
HEALTH RISK ANALYSIS
300 BLOCK OF MAIN STREET SUPPLEMENTAL STANDARDS APPLICATION

DOE ID NO.	ADDRESS	GAMMA (uR/h) BACKGROUND	SURFACE MAX.	SURFACE MIN.	EXPOSURE RATE ABOVE BACKGROUND	LONG-TERM EXPOSURE ANALYSIS: REQUIRED NUMBER OF HOURS OF CONTINUOUS EXPOSURE TO RECEIVE 100 mRem DOSE	LONG-TERM EXPOSURE ANALYSIS: REQUIRED NUMBER OF HOURS PER DAY OVER ONE YEAR TO RECEIVE 100 mRem DOSE	LONG-TERM EXPOSURE ANALYSIS: REQUIRED NUMBER OF HOURS PER DAY OVER 260 DAYS TO RECEIVE 100 mRem DOSE	SHORT-TERM EXPOSURE ANALYSIS: REQUIRED NUMBER OF HOURS OF CONTINUOUS EXPOSURE TO RECEIVE 500 mRem DOSE	SHORT-TERM EXPOSURE ANALYSIS: REQUIRED NUMBER OF 48 HOUR "REPAIR" SCENARIOS TO RECEIVE 500 mRem DOSE	SHORT-TERM EXPOSURE ANALYSIS: REQUIRED NUMBER OF 24 HOUR "EMERGENCY" SCENARIOS TO RECEIVE 500 mRem DOSE
GJ-00815-CS	306 MAIN	15	36	14	21	4,762	13	18	23,810	496	992
GJ-00817-CS	314 MAIN	16	42	18	26	3,846	11	15	19,231	401	801
GJ-00819-CS	316 MAIN	14	31	16	17	5,882	16	23	29,412	613	1,225
GJ-00826-CS	326 MAIN	14	39	18	25	4,000	11	15	20,000	417	833
GJ-00828-CS	336 MAIN	15	42	33	27	3,704	10	14	18,519	386	772
GJ-00829-CS	342 MAIN	13	41	13	28	3,571	10	14	17,857	372	744
GJ-00833-CS	352 MAIN	16	59	16	43	2,326	6	9	11,628	242	484
GJ-00814-CS	307 MAIN	15	24	18	9	11,111	30	43	55,556	1,157	2,315
GJ-00816-CS	309 MAIN	14	37	14	23	4,348	12	17	21,739	453	906
GJ-00818-CS	315 MAIN	14	57	18	43	2,326	6	9	11,628	242	484
GJ-00821-CS	319 MAIN	15	41	17	26	3,846	11	15	19,231	401	801
GJ-00824-CS	321 MAIN	15	34	27	19	5,263	14	20	26,316	548	1,096
GJ-00822-CS	327 MAIN	15	32	17	17	5,882	16	23	29,412	613	1,225
GJ-00469-CS	359 MAIN	15	32	17	17	5,882	16	23	29,412	613	1,225
* Worst Case Scenario:		13	59		46	2,174	6	8	10,870	226	453

* Worst Case Scenario is based on the lowest background and highest surface gamma measurements, regardless of whether they were found in same approximate location.

background. This is the dose limit for an individual member of the general public. Doses which exceed 100 mRem/year above background are acceptable when the higher exposures do not persist for long periods and when average annual dose over an individual's lifetime is expected to be less than 100 mRem/year above background. The ICRP and DOE suggest that dose rates be "reduced as low as is reasonably achievable", but also state that no annual dose shall exceed 500 mRem/year above background. The health risk analysis presented in this Application for Supplemental Standards has compared the dose rates expected at ground level with the recommendations of the ICRP and DOE regarding waist level exposures to ensure a conservative evaluation. The long-term exposure analysis considers the following three scenarios:

a. The required number of hours of continuous exposure to obtain the 100 mRem dose above background. This scenario models the exposure received by an individual residing on the site in question in the extreme case where no time away from the site is considered.

b. The hours per day of exposure during a continuous one year period required to receive the 100 mRem dose above background. This represents a maximum allowable daily exposure by an individual who continuously occupies the point where the high gamma reading occurs.

c. The hours per day of exposure during a one year period based on week days only (260 days), required to receive the 100 mRem dose above background. This models the potential exposure that could be received by an individual working in the area the indicated number of hours each day for one year.

The short-term unusual exposure analysis also considers three potential scenarios as follow:

a. The required number of hours of continuous exposure to obtain the 500 mRem dose above background. This scenario allows examination of the estimated time required, based on continuous exposure, to receive the allowable dose.

b. The number of 48-hour temporary occupancy periods, in one year, necessary to receive a 500 mRem dose above background. This scenario represents the case where an individual occupies the site for repair work or other short-term purposes.

c. The number of 24-hour periods of exposure, in one year, necessary to receive a 500 mRem dose above background. This scenario represents emergency operations to perform repair work at the site.

The worst case scenario is based on the minimum background and maximum surface gamma rates that were measured, without consideration of the relative physical location of each. In every case, the scenarios presented above can be described as unlikely

but possible. The scenarios do not create a model of likely situations but rather present data that can be used to evaluate the potential for a health hazard if this Supplemental Standards Application is approved.

The maximum gamma exposure rate, above background, occurs in the areas fronting 315 and 342 Main Street. The worst case scenario depicts occupation of a site for an average of 6 hours to 8 hours per day during a one year period. It is unlikely that this situation would occur in an area so close to the street without considerable changes in land ownership and uses.

B.3.2 Radon Health Risk Analysis

Prior to the UMTRA Program, the CDH administered the Grand Junction Remedial Action Project (GJRAP). During GJRAP, radioactive contaminants were identified and remedial action was performed at two Main Street locations. One of these properties, DOE ID No. GJ-00880-CS, located at 612 Main Street, was assessed with a twelve-inch-deep lens of mill tailings underlying a four-inch-concrete sidewalk. This deposit was adjacent to and within ten feet of the building front. Remedial action was performed in 1983 and a six-foot depth of tailings was removed adjacent to and within ten feet of the building front. Pre-remedial action gross radon working level (WL) inside the building was reduced from 0.058 WL to a post-construction gross working level of 0.013 WL.

The other property, DOE ID No. GJ-00849-CS, located at 455 Main Street, was assessed with one-foot to eight-foot exterior depth of contamination underlying a four-inch-concrete sidewalk. This deposit was adjacent to and within ten feet of the building on the north and east sides. Additionally, several areas of the basement floor slab and walls were underlain with contamination. Remedial action was performed in 1984 and the actual removal coincided with the assessed depths. The pre-remedial action gross working levels were reduced from 0.07 WL inside the building to a post-construction gross working level of 0.008 WL.

Based on the above referenced history of remedial actions, it is anticipated that completion of the Phase I remedial action will reduce radon below the EPA standard of 0.02 WL at GJ-00828-CS and GJ-00829-CS (336 and 342 Main Street, respectively). Dinosaur bones in the basement at 362 Main Street (GJ-00833-CS) are potential causes of the high RDC in this area. Completion of Phase I remedial action is expected to reduce the radon contribution from mill tailings, but it is doubtful that an acceptable WL can be achieved unless the dinosaur bones are removed.

RDC measurements in all the other structures in the 300 Block of Main Street indicate acceptable working levels even prior to Phase I remedial action.

B.4 Remediation Alternatives

B.4.1 Alternative 1 - Complete Remediation

B.4.1.1 Work Description

Work required for this alternative includes removing all contaminated planters, curbs, concrete pavement, and vegetation from the curb to the utility trench, inclusive, within the Phase II area as shown on Drawing Number 3-D97002-F2. The street, uncontaminated planters, and uncontaminated handicap ramps are excluded from this work.

B.4.1.2 Health Risk Analysis

Health risks due to the tailings within the area being considered for Supplemental Standards would be reduced to within acceptable EPA levels.

B.4.1.3 Engineering Data

No areas of contamination which exceed the EPA standards will remain in place. The estimated cost of remediation work required for this alternative is $203,854. A tabulation of the cost estimate elements is presented in Table B.T3. The estimated volume of contaminated materials removed is 1,070 cy.

B.4.2 Alternative 2 - Partial Remediation

B.4.2.1 Alternative Scenario Descriptions

Typically a partial remediation option entails excavation of the top 30 inches of material and replacement with uncontaminated material. The clean material would provide sufficient shielding to eliminate public exposure to elevated gamma radiation. Because the estimated average depth is only 24 inches, removal of up to 30 inches would result in complete remediation as presented in Alternative 1.

Another partial remediation concept for Main Street would entail removal of concrete and tailings in areas which would not adversely affect mature trees. These types of areas are small and scattered. Because of this condition, health risk reduction would be minimal, several utilities would be disturbed in a "patchwork" fashion, most work would have to be done by hand instead of with machines, and the new finished surfaces would not match existing remaining surfaces. This situation could

TABLE B.T3

COST ESTIMATE FOR PHASE II
ALTERNATIVE 1 - COMPLETE REMEDIATION

ITEM NUMBER	ITEM DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	TOTAL PRICE
1.	Traffic Control	LS	1	$ 7,000.00	$ 7,000
2.	Mobilization	LS	1	5,000.00	5,000
3.	Sawcut Concrete	LF	937	4.00	3,748
4.	Trees - Remove and Place New	EA	30	500.00	15,000
5.	Concrete Planters - Remove and Place New	EA	19	100.00	1,900
6.	Brick Planters - Remove and Place New	EA	3	1,500.00	4,500
7.	Light Poles - Remove and Reinstall	EA	13	400.00	5,200
8.	Gazebos - Remove and Reinstall	EA	2	900.00	1,800
9.	Concrete Sidewalk - Remove and Dispose	SF	11,300	0.75	8,475
10.	Irrigation Lines - Remove and Place New	LF	1,000	9.00	9,000
11.	Electrical Service - Remove and Place New	LF	900	12.50	11,250
12.	Drainage Pipe - Remove and Reinstall	LF	800	4.50	3,600
13.	Excavation of Contaminated Material - Haul and Dispose	CY	1,070	22.00	23,540
14.	Class 6 Backfill - Furnished and Installed	CY	837	18.75	15,694
15.	Topsoil - Furnished and Installed	CY	233	12.00	2,796
16.	Concrete Sidewalk - Furnished and Installed	SF	11,300	3.75	42,375

TABLE B.T3 (Cont.)

ITEM NUMBER	ITEM DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	TOTAL PRICE
17.	Brick Serpentine Wall - Remove and Place New	EA	2	$ 1,500.00	$ 3,000
18.	New Plantings - Furnished and Installed	LS	1	3,500.00	3,500
19.	Clean Up and Dust Control	LS	1	2,500.00	2,500
				SUBTOTAL:	$169,878
				CONTINGENCY (20%):	33,976
				TOTAL:	$203,854

create future management and control problems to avoid mixing remaining tailings with new clean material. Therefore, this scenario is not considered practical or effective in reducing potential health risks.

The scenario selected for consideration for partial remediation will result in complete remediation except that tailings within and/or under the large raised planters will be left in place.

B.4.2.2 Health Risk Analysis

Health risks due to the tailings within the area being considered for Supplemental Standards would be reduced to within acceptable EPA levels except within the large planters.

B.4.2.3 Engineering Data

The only areas of contamination which will exceed the EPA standards will be within the planters. The estimated cost of remediation work required for this alternative is $193,373. A tabulation of the cost estimate elements is presented in Table B.T4. The estimated volume of contaminated materials removed is 1,019 cy. The estimated volume of contaminated material left in place is 51 cy.

B.4.3 Alternative 3 - No Remediation (Application of Supplemental Standards)

B.4.3.1 Work Description

No work is required for this Alternative.

B.4.3.2 Health Risk Analysis

The health risks associated with this Alternative are approximated in Table B.T2. There is an extremely low probability that allowable gamma dose rates will be exceeded, based on the data presented in Table B.T2.

B.4.3.3 Alternative Specific Issues

Working levels which exceed the EPA standards have been found at 336, 342, and 362 Main Street (DOE ID Nos. GJ-00828-CS, GJ-00829-CS, and GJ-00833-CS, respectively). The responsibility for lowering these levels will be part of the Phase I remediation and/or part of the individual property remediations.

TABLE B.T4

COST ESTIMATE FOR PHASE II
ALTERNATIVE 2 - PARTIAL REMEDIATION

ITEM NUMBER	ITEM DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	TOTAL PRICE
1.	Traffic Control	LS	1	$ 7,000.00	$ 7,000
2.	Mobilization	LS	1	5,000.00	5,000
3.	Sawcut Concrete	LF	937	4.00	3,748
4.	Trees - Remove and Place New	EA	25	500.00	12,500
5.	Concrete Planters - Remove and Place New	EA	19	100.00	1,900
6.	Light Poles - Remove and Reinstall	EA	13	400.00	5,200
7.	Gazebos - Remove and Reinstall	EA	2	900.00	1,800
8.	Concrete Sidewalk - Remove and Dispose	SF	11,300	0.75	8,475
9.	Irrigation Lines - Remove and Place New	LF	1,000	9.00	9,000
10.	Electrical Service - Remove and Place New	LF	900	12.50	11,250
11.	Drainage Pipe - Remove and Reinstall	LF	800	4.50	3,600
12.	Excavation of Contaminated Material - Haul and Dispose	CY	1,019	22.00	22,418
13.	Class 6 Backfill - Furnished and Installed	CY	837	18.75	15,694
14.	Topsoil - Furnished and Installed	CY	182	12.00	2,184
15.	Concrete Sidewalk - Furnished and Installed	SF	11,300	3.75	42,375
16.	Brick Serpentine Wall - Remove and Place New	EA	2	1,500.00	3,000

TABLE B.T4 (Cont.)

ITEM NUMBER	ITEM DESCRIPTION	UNITS	QUANTITY	UNIT PRICE	TOTAL PRICE
17.	New Plantings - Furnished and Installed	LS	1	$ 3,500.00	$ 3,500
18.	Clean Up and Dust Control	LS	1	2,500.00	2,500
				SUBTOTAL:	$161,144
				CONTINGENCY (20%):	32,229
				TOTAL:	$193,373

B.4.3.4 Engineering Data

No cost is associated with this alternative. The approximate volume of contaminated materials that will be left in place is 1,070 cy.

B.5 Summary

The data in Table B.T2 suggests that there are no identifiable significant health risks if this Application for Supplemental Standards is approved. In the worst case, a person would have to occupy the point of high gamma exposure for a continuous period of 2,174 hours to receive a 100 mRem dose. It is unlikely that an individual would be exposed for the amount of time necessary to exceed the recommended annual maximum dose of 100 mRem, due to both the length of time required and the physical location of those exposure rates.

No change in land use is expected within the foreseeable future. The City of Grand Junction has suggested that some construction work may occur in this area for tree replacement and utility modifications/repair, but the time frame within which this work would occur is undefined.

There is a potential for future tailings migration from the Main Street area if this Application for Supplemental Standards is approved. Tailings exist in many locations that are outside the limits of the UMTRA Program regardless of the final status of this Application. Each alternative examined by this Application is summarized as follows:

Alternative 1 - Complete Remediation
- Health Risk - Reduced to within acceptable EPA levels
- Construction Cost - $203,854
- Estimated Volume of Contaminated Materials Removed - 1,070 cy
- Estimated Volume of Contaminated Materials Left In Place - 0 cy

Alternative 2 - Partial Remediation
- Health Risk - Reduced to within acceptable EPA levels, except within two large planters
- Construction Cost - $193,373
- Estimated Volume of Contaminated Materials Removed - 1,019 cy
- Estimated Volume of Contaminated Materials Left In Place 51 cy

Alternative 3 - No Remediation (Application of Supplemental Standards)
- Health Risk - See Table B.T2
- Construction Cost - $0
- Estimated Volume of Contaminated Materials Removed - 0 cy
- Estimated Volume of Contaminated Materials Left In Place - 1,070 cy

B.6 Recommendations

Supplemental Standards should be applied under 40 CFR 192.21 Criteria C (see Section B.1). A long-term tailings management, disposal, and migration control plan should be developed and implemented.

David C. Durant — 6-1-89

Prepared by
David C. Durant

Date

T. E. Huber — 6-1-89

Reviewed by
T. E. Huber

Date

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