ARCADIS
Infrastructure, environment, buildings

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Mr. Paul Kurzanski
CSX Transportation
500 Water Street, J-275
Jacksonville, Florida 32202

ENVIRONMENTAL

Subject:
Results of the Radiometric Survey, Inkster Road Site, Livonia, Michigan.
CSXT Project Number: 9717003
CSXT Work Order Number: ENV980296PJK1
ARCADIS Geraghty & Miller Project No. MI000652.0001

Novi, Michigan,
June 5, 1998

Contact:
Patrick J. Bartnik, C.P.G.

Extension:
110

Dear Mr. Kurzanski:

On March 29, 1994, the United States Nuclear Regulatory Commission (NRC) informed AAR Manufacturing Group (AAR) that radioactive contamination, which exceeded regulatory guidelines, had been discovered at the AAR facility (NRC 1997). The AAR facility, located at 12633 Inkster Road, Livonia, Michigan, had been licensed by the Atomic Energy Commission to use thorium (contained in a 40% thorium master alloy and in a thorium magnesium alloy) in manufacturing products that contained this licensed material. On December 26, 1996, the NRC performed an independent radiation survey of the CSX Transportation, Inc. (CSXT) right-of-way (ROW) directly adjacent to the AAR facility (see Figure 1). This survey was related to a site characterization report and site remediation plan submitted to the NRC by AAR. During that survey, the NRC detected elevated levels of thorium in soil samples collected from three separate location. In a June 12, 1997 letter to CSXT, Mr. Roy Caniano, Acting Director of the NRC's Division of Nuclear Materials Safety, informed CSXT that the impacts do not represent a safety and health issue, but that the quantities are above the NRC release guideline for unrestricted use.

In a September 8, 1997 letter to CSXT, Mr. B. L. Jorgensen, Chief of the NRC's Decomissioning Branch, requested that CSXT perform an accurate characterization

of the affected areas to more clearly determine the extent of impacts. On behalf of CSXT, ARCADIS Geraghty & Miller performed a survey of the area and presents its findings in this report.

FIELD METHODS

ESTABLISH GRID

ARCADIS Geraghty & Miller began the field work by establishing a grid over the affected area within the CSXT ROW (see Figure 2). The long (east-west) dimension of the grid extended eastward from a point approximately 60 feet west of Inkster Road to a point corresponding to the western property boundary of AAR. The short (north-south) dimension of the grid extended northward from the CSXT rails to the AAR property boundary. Overall grid size was 1,210 feet by 38 feet. The grid was established with 5-foot centers. Permanent markers were painted on the CSXT rails to permit reestablishment of the grid at a future date.

During the establishment of the grid, and all other work within the CSXT ROW, a CSXT flagman was present to watch for and communicate with on-coming rail traffic, to ensure the safety of site workers.

EQUIPMENT

ARCADIS Geraghty & Miller used a Victoreen Survey and Count meter, Model 190, (scintillometer) fitted with a Victoreen GM Probe Model RP-1. This configuration detects alpha, beta, and gamma radiation, and has an operating range of 1 microroentgen per hour (μR/hr) to 1 roentgen per hour (R/hr).

MEASUREMENT

ARCADIS Geraghty & Miller began the survey by collecting a background radiation measurement near the origin of the grid. The background radiation ranged from 0 μR/hr to approximately 24 μR/hr.

ARCADIS Geraghty & Miller measured both surface and subsurface soils with the scintillometer. Radiation readings of surface soils were collected from a height of 6 inches above ground surface. The highest readings were recorded. To measure the subsurface soils, ARCADIS Geraghty & Miller used a tube-sampler soil probe to extract a soil sample from a depth of approximately one foot below ground surface (where crushed stone ballast was present, ARCADIS Geraghty & Miller cleared this ballast away to expose the underlying soil, and then collected a soil sample from a depth of one foot below exposed surface of the soil). The soil sample was removed from the sampler and then measured with the scintillometer. Subsurface measurements were collected at those locations whose surface radiation measurements were the greatest and at other randomly selected locations.

The spacing of the surface soils measurements along the east-west gridlines was 10 feet, beginning at the grid origin (node A,0). The spacing of the surface soils measurements along the north-south gridlines was 5 feet, also beginning at the grid origin. The surface soils measurement collection locations and their values are shown on Figures 3 through 3E.

After the surface soil measurements were evaluated, ARCADIS Geraghty & Miller returned to the site to collect the subsurface soil measurements. These subsurface measurements were collected at those locations where surface soil radiation measurements were elevated, and at other randomly selected locations. The subsurface soils were not measured at all locations. The subsurface soils

measurement collection locations and their values are shown on Figures 4 through 4E.

RESULTS

SURFACE SOIL MEASUREMENTS

The results of the investigation indicate that radiation measurements of surficial soils range from background to 71 μR/hr. The highest readings observed by ARCADIS Geraghty & Miller were noted at coordinates H220 (71.1 μR/hr) and H148 (64 μR/hr). The highest reading recorded by the NRC on December 26, 1996 was 130 μR/hr. The highest ARCADIS Geraghty & Miller reading is approximately 55 percent of the highest NRC reading. This difference may be due to the different instrumentation used by ARCADIS Geraghty & Miller and the NRC.

The greatest number of readings were below 30 μR/hr. As the following list shows, only 19 of the 1,034 measurements were greater than 30 μR/hr. The entire dataset was compared to the value of 30 μR/hr because this value was only slightly greater than the background radiation level, and values greater than this could positively be attributed to environmental impacts.

- East-west gridline A, the gridline coincidental with the CSXT rail, had the overall lowest readings with only one measurement, that at coordinate A74, above 30 μR/hr.
- East-west gridline B, the gridline directly north of gridline A, also only had one measurement, located at coordinate B136 (38.4 μR/hr), above 30 μR/hr.
- East-west gridline C, had only three measurements above 30 μR/hr (C102 [37.7 μR/hr], C148 [32.2 μR/hr], and C150 [31.1 μR/hr]).
- East-west gridline D, had four measurements above 30 μR/hr (D144 [36.5 μR/hr], D126 [32.3 μR/hr], D114 [32μR/hr], and D116 [31.4 μR/hr).
- East-west gridline E had no measurements above 30 μR/hr.

- East-west gridline F had only two measurements above 30 μR/hr (E74 [33.1 μR/hr] and C136 [30.2 μR/hr].
- East-west gridline G had only one measurement above 30 μR/hr (G142 [49.9 μR/hr]).
- East-west gridline H had five measurements above 30 μR/hr (H220 [71.1 μR/hr], H148 [64 μR/hr], H218 [34.4 μR/hr], H64 [32 μR/hr] and H86 [30.1 μR/hr].
- Finally, east-west gridline I had only two measurements above 30 μR/hr (I82 [33.4 μR/hr] and I84 [48 μR/hr]).

SUBSURFACE SOIL MEASUREMENTS

Subsurface soils radiation measurements ranged from background to 50 μR/hr. Sixty subsurface measurements were collected at those locations whose surface radiation measurements were the greatest. Table 2 provides a summary of the locations and their measurements (see also Figures 4 through 4E).

Those surface locations whose radiation readings were highest were I84, G142, H148, and H220. The surface and subsurface radiation readings for these locations are presented in the table below.

Coordinate	Surface Reading	Subsurface Reading
I84	48 μR/hr	41.1 μR/hr
G142	49.9 μR/hr	17.1 μR/hr
H148	64 μR/hr	9.8 μR/hr
H220	71.1 μR/hr	22.1 μR/hr

These data suggest that only one location, coordinate I84, has impacts that extend deeper than the ground surface. However, at several locations, subsurface readings were greater than the surficial readings. These data are presented below.

Coordinate	Surface Reading	Subsurface Reading
D226	10.3μR/hr	50 μR/hr
E222	12 μR/hr	43 μR/hr
E202	7.1 μR/hr	47.6 μR/hr

H192	8 μR/hr	41.1 μR/hr

These coordinates are all located west of the AAR Manufacturing building, approximately one-half way between the building and the AAR Manufacturing western property boundary.

ESTIMATED VOLUME OF IMPACTED SOILS

For the purpose of calculating the volume of soils impacted by radioactive contamination, ARCADIS Geraghty & Miller assumed that:

- only those locations (coordinates) where scintillometer readings exceeded 30 μR/hr required excavation. For these areas, ARCADIS Geraghty & Miller assumes an excavation radius of five feet.
- impacts in all areas do not extend below a depth of one foot, except at those locations where subsurface readings were greater than surface readings. At these locations, ARCADIS Geraghty & Miller assumes impacts extend to a depth of two feet.
- at coordinate I84, whose surface soil measurement was 48 μR/hr and whose subsurface soil measurement was 41.1 μR/hr, the impacts extend to a depth of two feet.

As was reported in the *Results-Surface Soil Measurements* section of this report, scintillometer measurements exceeded 30 μR/hr at 19 locations. Assuming a five foot radius and a depth of one foot, the volume of impacted soils at each location is approximately 0.75 cubic yard (yd^3). The total volume of impacted soils for these 20 locations is, therefore, 15 yd^3.

As was reported in the *Results-Subsurface Soil Measurements* section of this report, at 4 locations, subsurface readings were greater than surface readings. Assuming a five foot radius and a depth of two feet, the volume of impacted soils at each

location is approximately 1.5 yd^3. The total volume of impacted soils for these 4 locations is, therefore, 6 yd^3.

The volume of impacted soils at coordinate I84, assuming a five foot radius and a depth of two feet, is approximately 1.5 yd^3.

Based on the assumptions discussed above, the total volume of impacted soils at the Inkster Road site is approximately, 23 yd^3.

ARCADIS Geraghty & Miller appreciates the opportunity to provide environmental services for CSXT. Should you have any questions or require clarification, please contact Pat Bartnik.

Sincerely,
ARCADIS Geraghty & Miller, Inc.

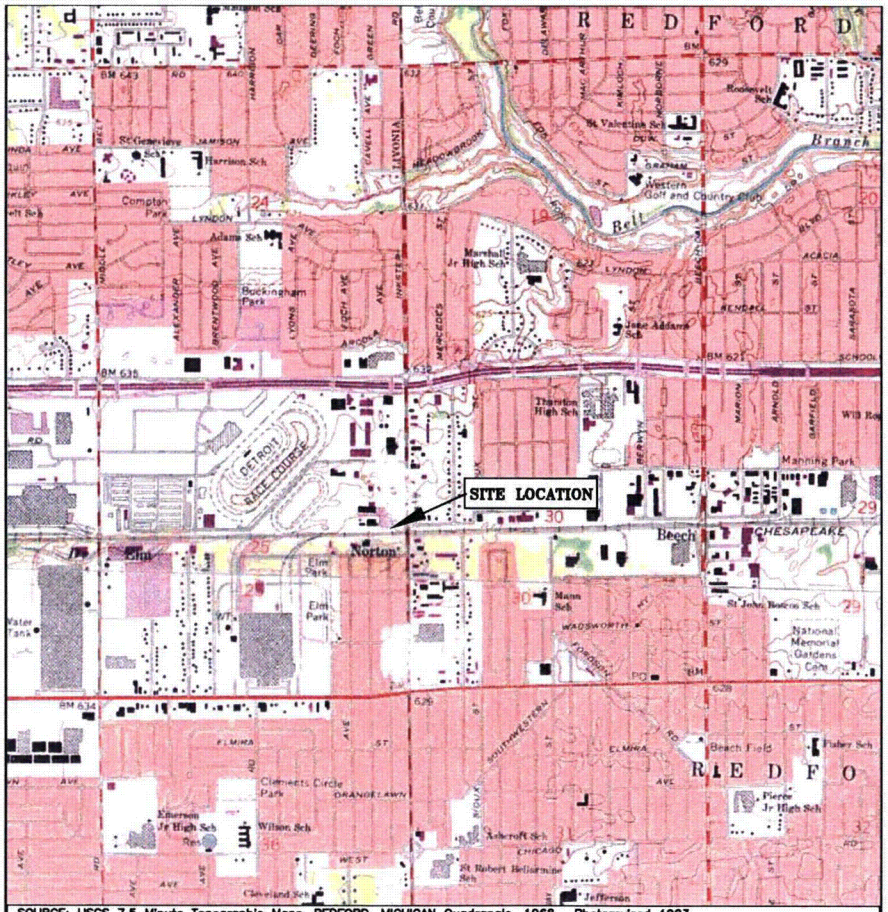
Patrick J. Bartnik, C.P.G.
Staff Scientist/Project Manager

Steve Figgins
Associate/Regional Manager

Enclosures

REFERENCES

United States Nuclear Regulatory Commission 1997. Inspection Report No. 040-00235/97001(DNMS) AAR Manufacturing Inc., Former Brooks & Perkins Facility, Livonia, Michigan . May 15, 1997.



ARCADIS GERAGHTY&MILLER

SITE LOCATION MAP
CSX TRANSPORTATION
CSXT 9717003; ENV9939955PJKK
INKSTER ROAD SITE
LIVONIA, MICHIGAN

DATE: 2/04/03	PROJECT MANAGER: K. PINIGER	DRAWING NAME: TOPO
DRAWN: S. JONES	LEAD DESIGN PROF.:	CHECKED: S. JONES
PROJECT NUMBER: MI000703.003.00001		PAGE NUMBER: 1

Figure 7. Dose vs. time using average isotopic concentrations of November samples as initial conditions, all pathways considered, and assumed residential use with no soil cover.

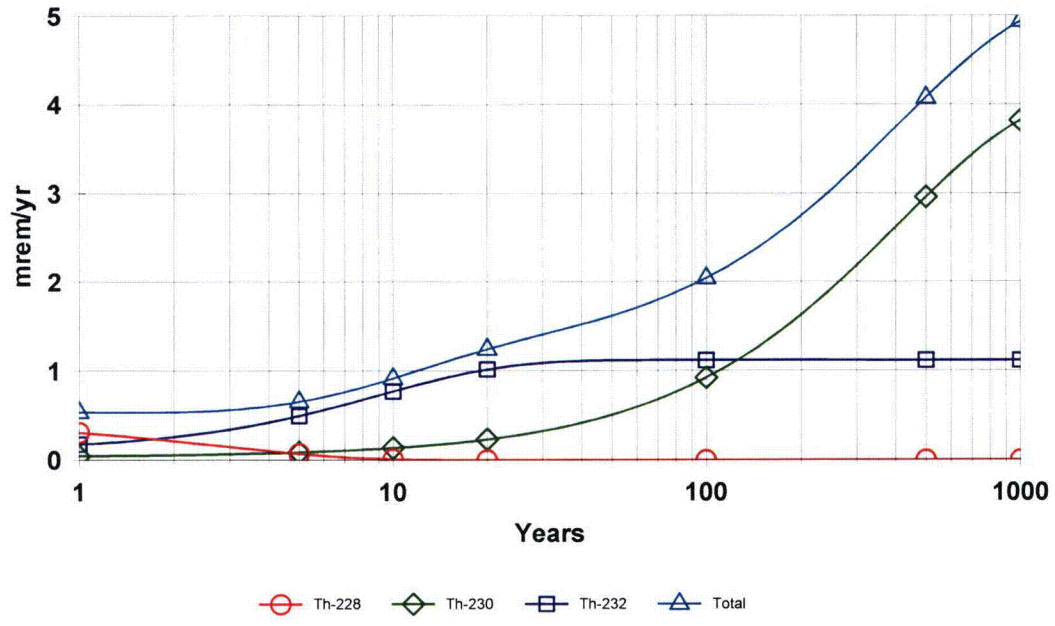


Figure 8. Dose vs. time using average isotopic concentrations of November samples as initial conditions, all pathways considered, and assumed residential use with 6 inch cover.

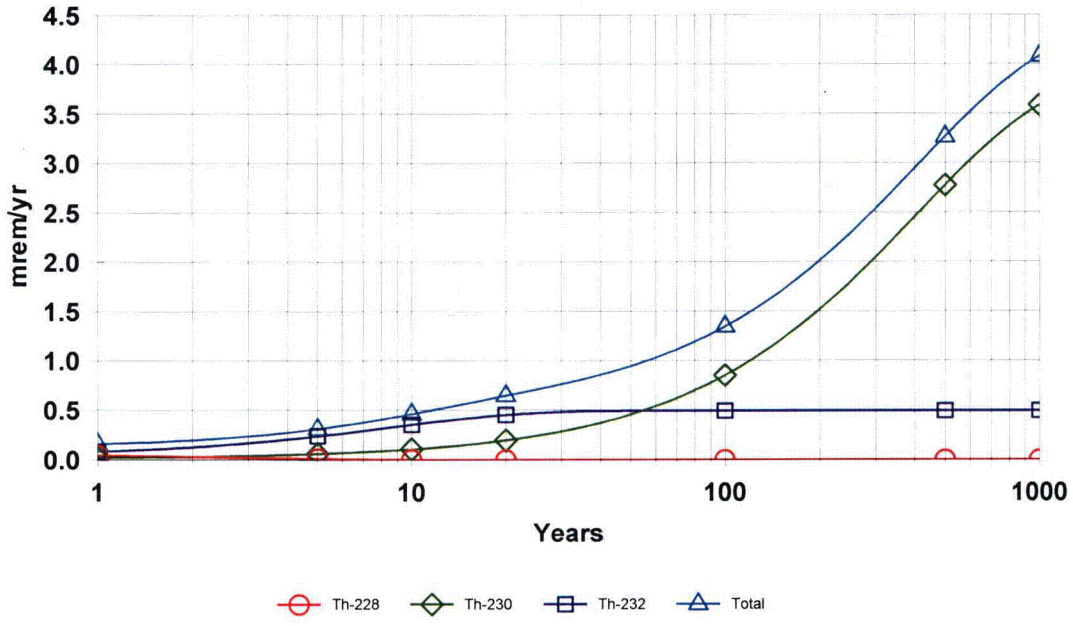


Figure 9. Dose vs. time using average isotopic concentrations of November samples as initial conditions, no plant ingestion, and assumed residential use with no soil cover.

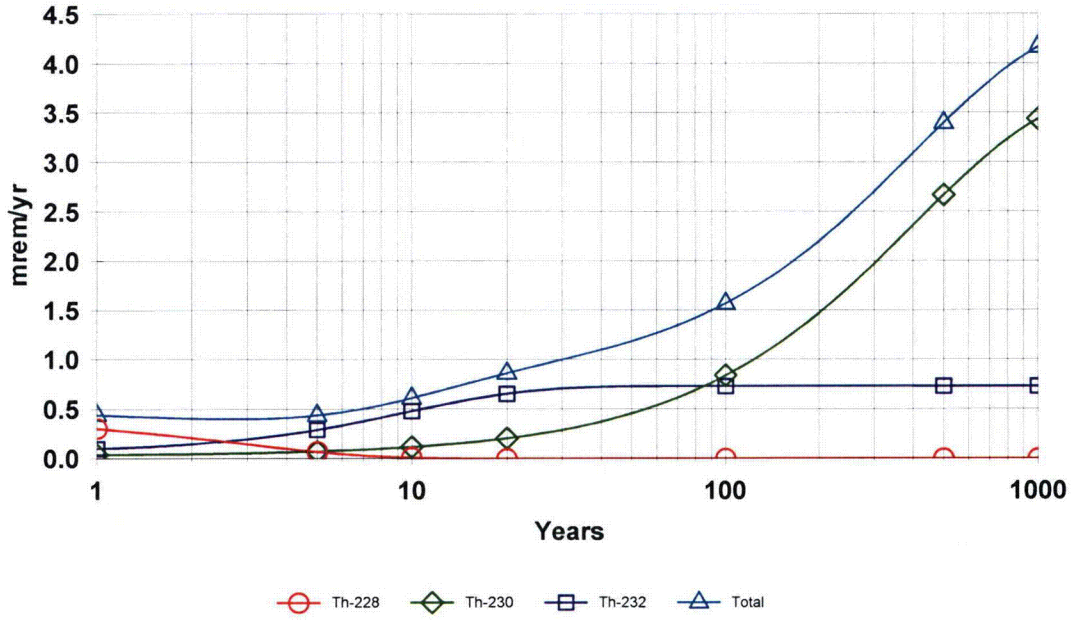


Figure 10. Dose vs. time using average isotopic concentrations of November samples as initial conditions, no plant ingestion, and assumed residential use with 6 inch soil cover.

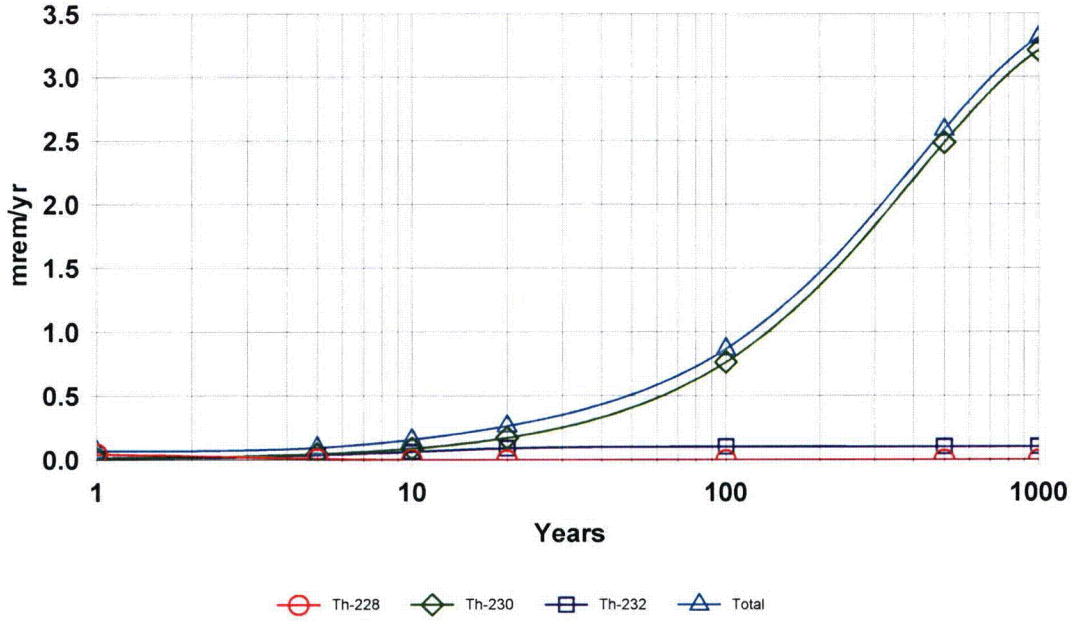


Figure 11. Dose vs. time using average isotopic concentrations of November samples as initial conditions, all pathways considered, and assumed industrial use with no soil cover.

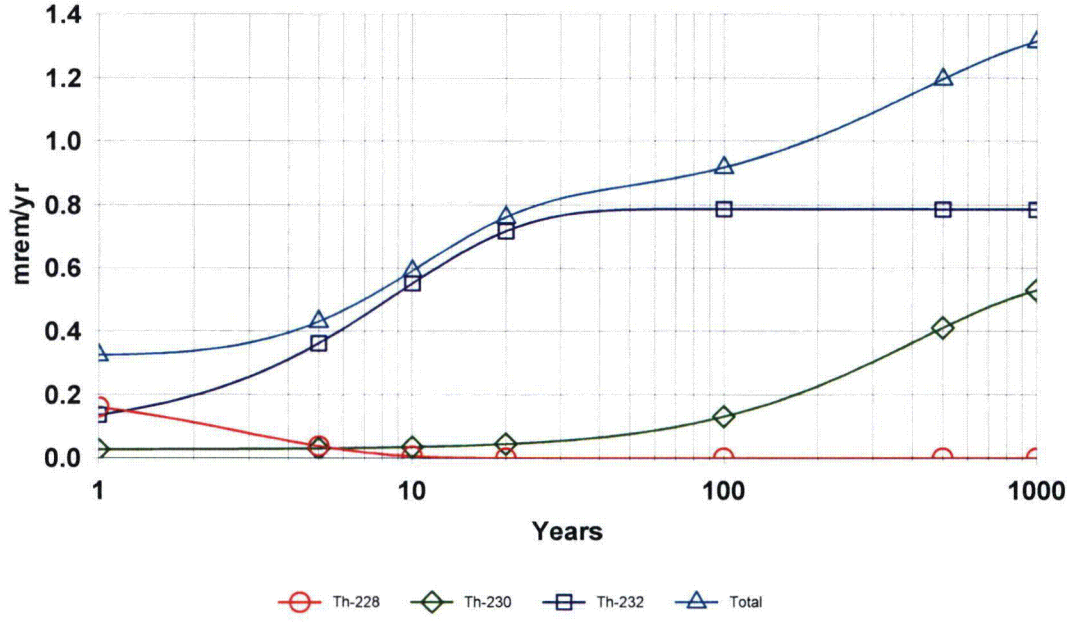


Figure 12. Dose vs. time using average isotopic concentrations of November samples as initial conditions, all pathways considered, and assumed industrial use with 6 inch soil cover.

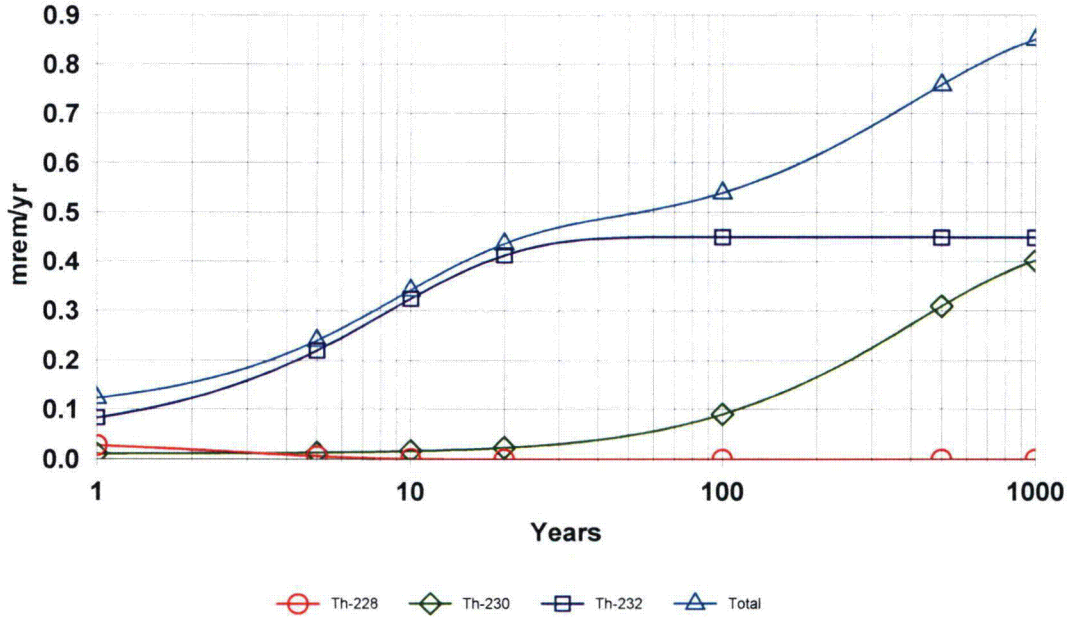


Figure 13. Dose vs. time using average isotopic concentrations of November samples as initial conditions, no plant ingestion, and assumed industrial use with no soil cover.

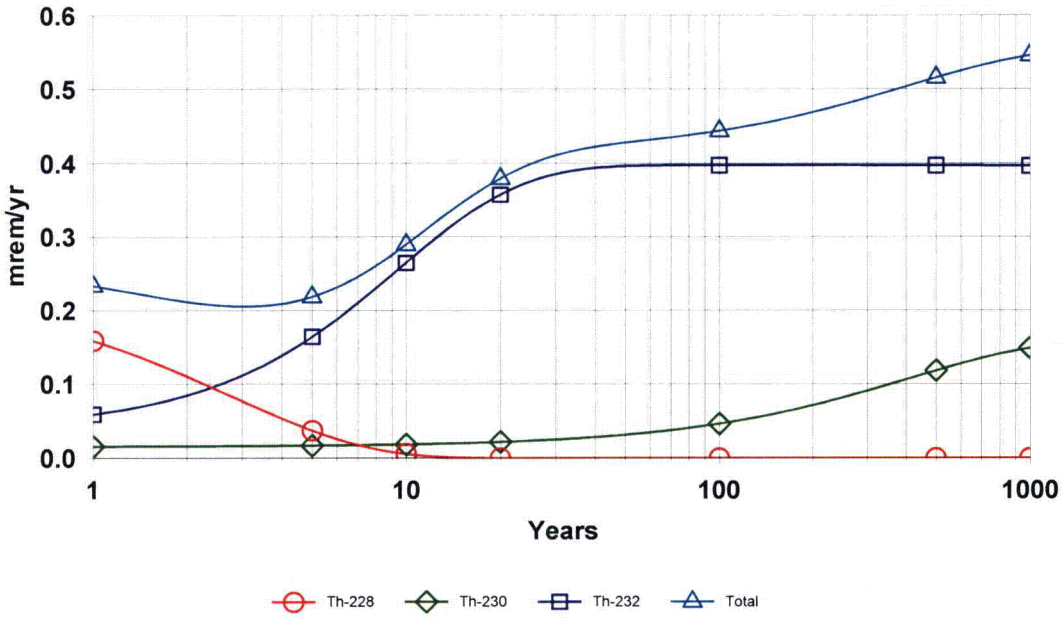
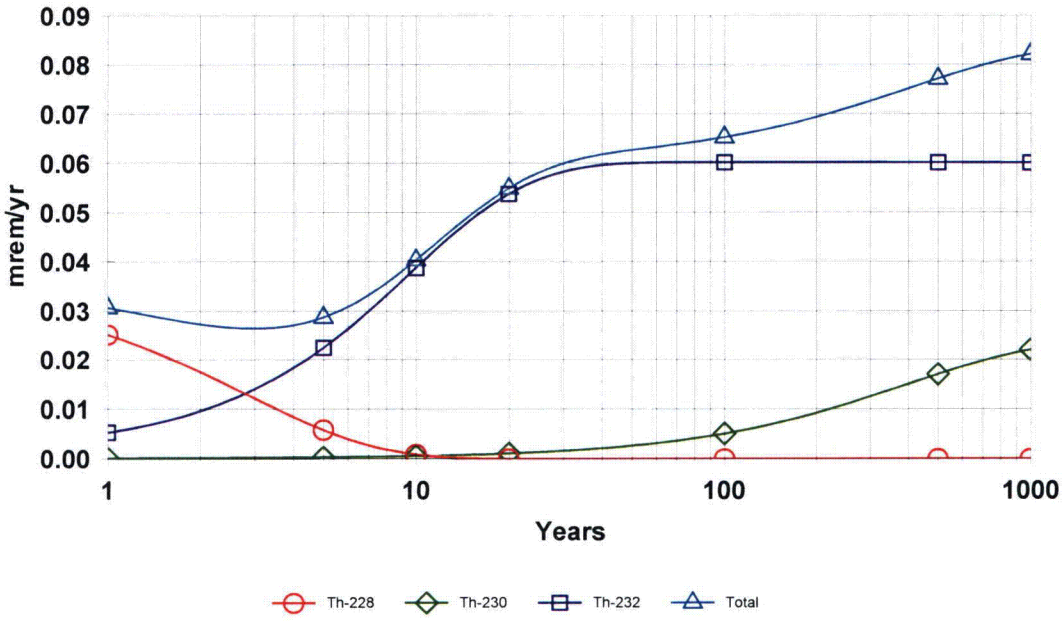
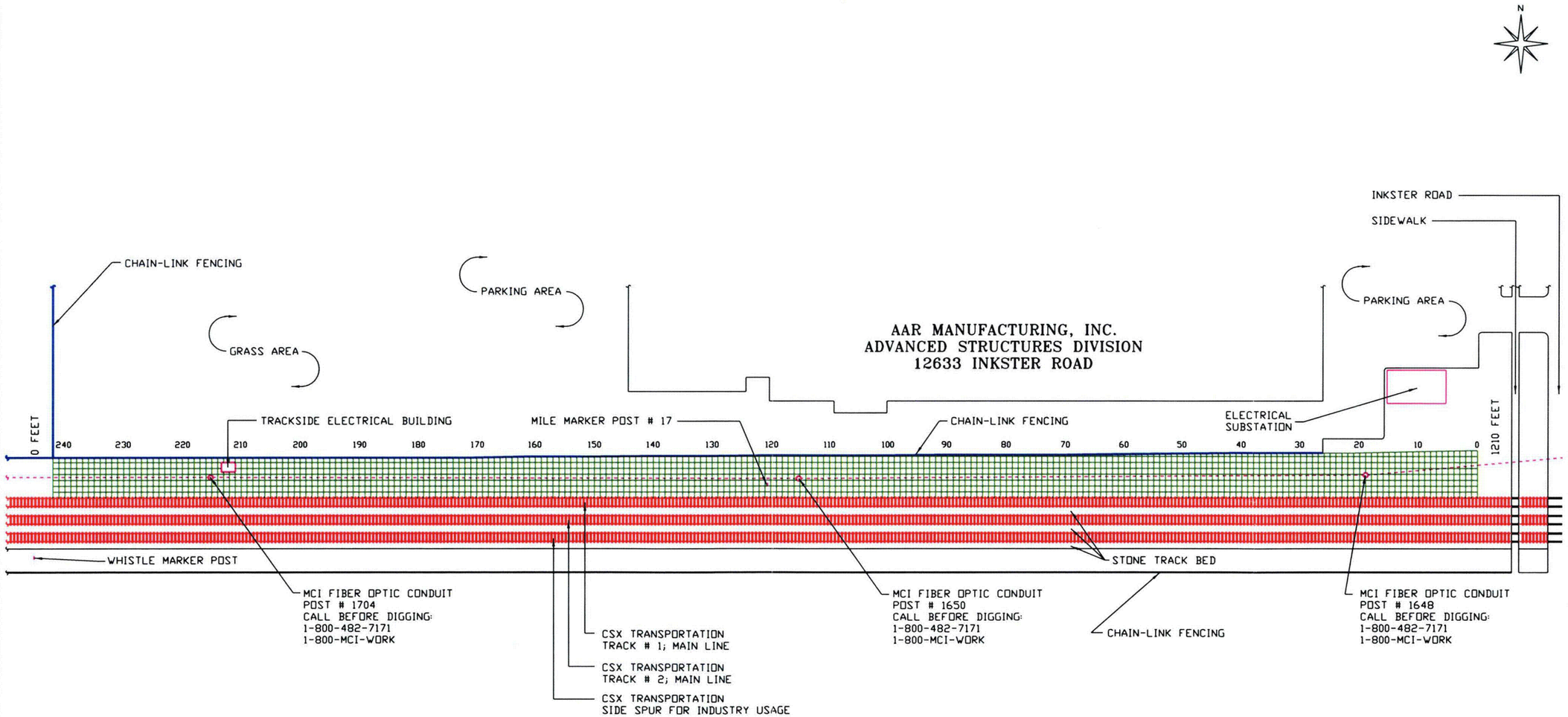


Figure 14. Dose vs. time using average isotopic concentrations of November samples as initial conditions, no plant ingestion, and assumed industrial use with 6 inch soil cover.





RADIOMETRIC SURVEY GRID.
GRID CONSTRUCTED UTILIZING 5 FOOT BY 5 FOOT SQUARES.
APPROXIMATE GRID DIMENSIONS: 1210 FEET LENGTH (E TO W). 34 TO 40 FEET WIDE (N TO S).

NO.	DATE	REVISION DESCRIPTION	BY / CKD

ARCADIS GERAGHTY & MILLER
41511 ELEVEN MILE ROAD
NOVI, MICHIGAN 48375
TEL: 248/305-9400 FAX:248/305-9401

SITE LAYOUT MAP
CSX TRANSPORTATION
CSXT 9717003; ENV993955PJKK
INKSTER ROAD SITE
LIVONIA, MICHIGAN

DRAWN BY: SEAN JERIC	DRAWING DATE: 022198/053000
PROJECT MANAGER: K. PANCZAK	DRAWING NAME: LAYOUT
LEAD DESIGN PROF:	CHECKED: K. PANCZAK
PROJECT NUMBER: MI000703.0003	DRAWING NUMBER: FIGURE 2

N

SCALE IN FEET:

0 20 40

READINGS RECORDED EVERY 10 FEET PER ROW, TAKEN FROM BOTTOM LEFT HAND CORNER.
UNITS: uR / HR
25.0
DEEP WATER, NO READING RECORDED
LOCATION OF SUBSURFACE FIBER OPTIC CONDUIT
CHAIN-LINK FENCING

LEGEND

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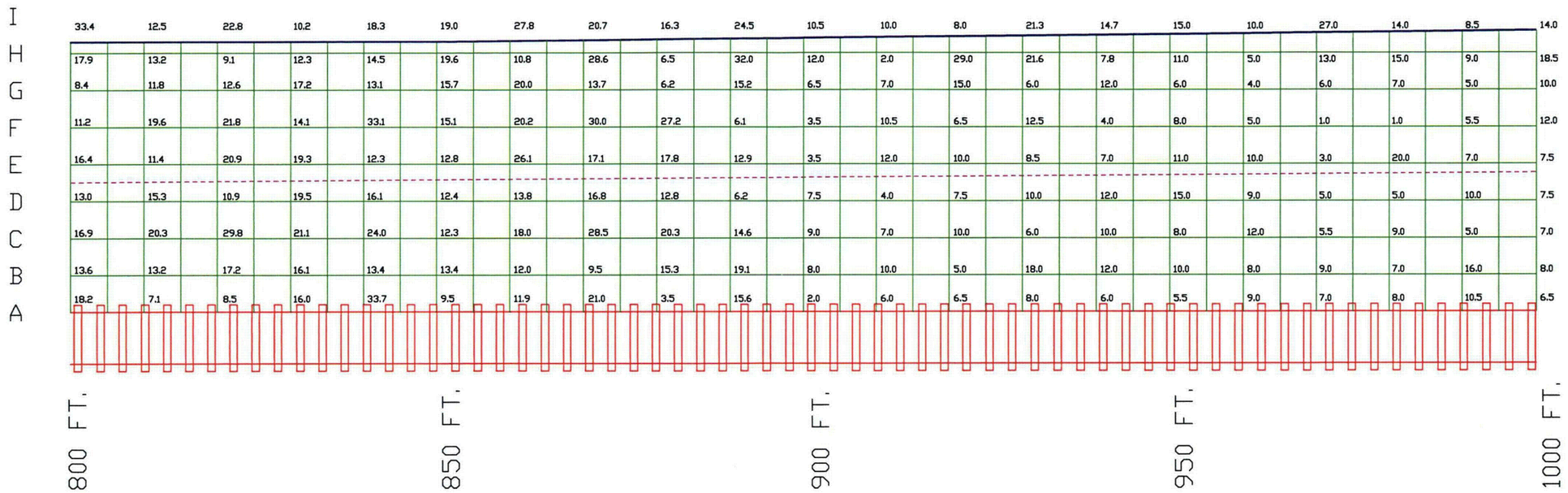
RADIOMETRIC SURVEY RESULTS
CSX TRANSPORTATION
CSXT 9717003; ENV993955PJKK
INKSTER ROAD SITE
LIVONIA, MICHIGAN

DRAWN BY: SEAN JERIC	DRAWING DATE: 022198/053000
PROJECT MANAGER: K. PANCZAK	DRAWING NAME: SCAN
LEAD DESIGN PROF:	CHECKED: K. PANCZAK
PROJECT NUMBER: MI000703.0003	DRAWING NUMBER: FIGURE 3



SCALE IN FEET:

0 20 40

READINGS RECORDED EVERY 10 FEET PER ROW, TAKEN FROM BOTTOM LEFT HAND CORNER.
25.0
UNITS: uR / HR

----- LOCATION OF SUBSURFACE FIBER OPTIC CONDUIT

——— CHAIN-LINK FENCING

LEGEND

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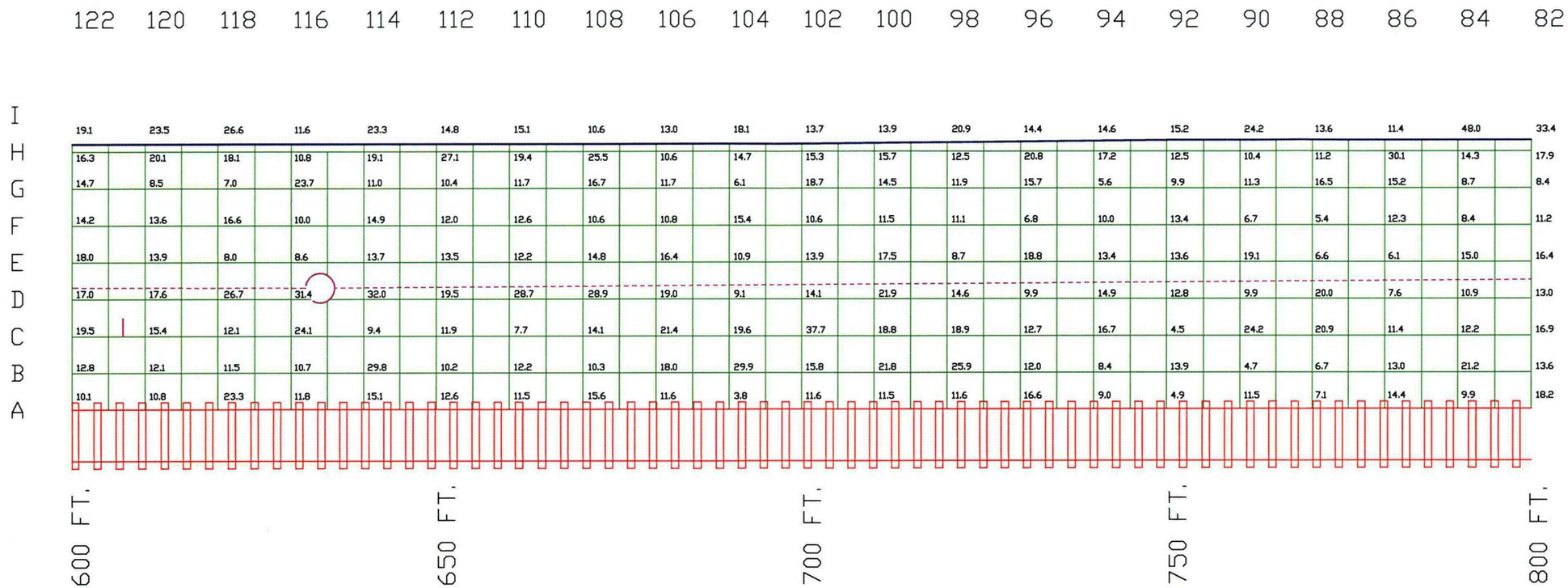
RADIOMETRIC SURVEY RESULTS
CSX TRANSPORTATION
CSXT 9717003; ENV993955PJKK
INKSTER ROAD SITE
LIVONIA, MICHIGAN

DRAWN BY: SEAN JERIC	DRAWING DATE: 022198/053000
PROJECT MANAGER: K. PANCZAK	DRAWING NAME: SCAN
LEAD DESIGN PROF:	CHECKED: K. PANCZAK
PROJECT NUMBER: MI000703.0003	DRAWING NUMBER: FIGURE 3A



N

SCALE IN FEET:

0 20 40

READINGS RECORDED EVERY 10 FEET PER ROW, TAKEN FROM BOTTOM LEFT HAND CORNER.
UNITS: uR / HR

25.0

LOCATION OF SUBSURFACE FIBER OPTIC CONDUIT

CHAIN-LINK FENCING

LEGEND

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RADIOMETRIC SURVEY RESULTS
CSX TRANSPORTATION
CSXT 9717003; ENV9939PJKK

INKSTER ROAD SITE
LIVONIA, MICHIGAN

DRAWN BY: SEAN JERIC	DRAWING DATE: 022196/063000
PROJECT MANAGER: K. PANCZAK	DRAWING NAME: SCAN
LEAD DESIGN PROF:	CHECKED: K. PANCZAK
PROJECT NUMBER: MI000703.0003	DRAWING NUMBER: FIGURE 3B

	162	160	158	156	154	152	150	148	146	144	142	140	138	136	134	132	130	128	126	124	122	
I																18.8	14.3	28.1	16.7	23.7		19.1
H	12.9	14.3	13.3	11.7	6.1	13.5	29.7	64.0	18.9	11.7	16.6	20.6	13.0	25.8	18.8	23.8	26.5	12.9	15.0	28.5		16.3
G	9.5	8.2	11.6	9.0	8.7	13.2	10.9	28.3	22.7	15.6	49.9	8.8	10.9	19.1	13.9	15.8	18.9	14.7	11.3	11.4		14.7
F	11.2	13.2	9.8	15.5	14.5	29.4	11.6	21.6	9.7	17.4	12.2	15.4	12.8	30.2	15.8	15.0	12.5	12.2	15.4	9.0		14.2
E	12.4	11.2	12.2	13.3	13.0	10.6	13.6	17.9	17.4	16.3	13.3	23.9	20.8	10.5	11.8	13.4	26.4	23.9	13.7	10.8		18.0
D	13.4	11.2	14.8	12.3	16.0	13.9	20.7	13.0	15.7	36.5	13.3	8.1	9.8	10.7	17.2	16.5	12.1	13.2	32.3	26.1		17.0
C	13.5	12.8	12.4	10.9	11.3	12.5	31.3	32.2	17.7	25.0	8.8	10.1	12.0	13.1	20.8	12.1	11.0	12.2	13.0	11.4		19.5
B	14.4	15.9	9.0	13.8	12.9	13.7	16.4	12.0	3.6	10.6	9.2	11.0	11.9	38.4	15.8	18.5	6.5	14.8	12.6	13.5		12.8
A	9.6	7.9	11.9	11.5	18.2	14.5	14.1	12.4	7.9	12.1	10.1	12.0	8.2	8.3	12.2	17.5	13.7	14.4	23.5	11.5		10.1
	400 FT.					450 FT.					500 FT.					550 FT.					600 FT.	

N

SCALE IN FEET:

0 20 40

READINGS RECORDED EVERY 10 FEET PER ROW, TAKEN FROM BOTTOM LEFT HAND CORNER.
UNITS: uR / HR

25.0

LOCATION OF SUBSURFACE FIBER OPTIC CONDUIT

CHAIN-LINK FENCING

LEGEND

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RADIOMETRIC SURVEY RESULTS
CSX TRANSPORTATION
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LIVONIA, MICHIGAN

DRAWN BY: SEAN JERIC	DRAWING DATE: 022198/053000
PROJECT MANAGER: K. PANCZAK	DRAWING NAME: SCAN
LEAD DESIGN PROF:	CHECKED: K. PANCZAK
PROJECT NUMBER: MI000703.0003	DRAWING NUMBER: FIGURE 3C

	202	200	198	196	194	192	190	188	186	184	182	180	178	176	174	172	170	168	166	164	162	
H	17.5	13.2	10.7	9.3	17.4	8.0	11.3	10.7	12.3	12.5	12.2	12.8	13.6	16.3	13.7	10.5	9.8	11.4	11.4	7.5		12.9
G	10.7	12.6	12.0	13.5	20.6	12.6	12.9	11.4	11.5	16.7	13.5	18.1	11.1	14.3	8.8	10.4	10.6	10.9	8.3	7.9		9.5
F	10.7	6.9	9.9	9.2	8.7	8.2	11.5	10.2	13.0	9.9	8.9	9.9	16.3	10.8	9.3	12.6	13.0	13.4	12.4	17.2		11.2
E	7.1	9.3	13.1	12.5	15.2	9.9	10.4	9.8	15.4	10.9	9.1	11.4	12.1	12.5	10.3	11.7	12.5	10.6	13.8	12.5		12.4
D	14.1	19.6	12.9	12.1	12.9	10.4	13.8	9.3	14.0	10.0	15.1	16.1	12.9	16.7	8.8	10.1	6.5	16.1	9.1	14.7		13.4
C	12.9	15.6	14.5	12.7	18.1	13.7	12.6	13.0	14.2	10.7	10.3	11.5	14.9	13.0	12.7	7.9	4.5	13.5	12.0	12.2		13.5
B	15.3	15.9	8.0	9.9	10.8	10.2	15.9	11.6	13.5	13.7	8.1	11.3	9.0	13.1	7.5	11.2	7.7	13.4	9.7	9.2		14.4
A	9.8	11.4	9.3	14.3	16.7	6.5	12.2	12.5	12.3	7.9	10.4	4.1	9.9	7.8	9.7	8.4	7.0	7.5	14.6	12.0		9.6
		200 FT.				250 FT.				300 FT.						350 FT.					400 FT.	

N

SCALE IN FEET:

0 20 40

READINGS RECORDED EVERY 10 FEET PER ROW, TAKEN FROM BOTTOM LEFT HAND CORNER.
UNITS: uR / HR

25.0

LOCATION OF SUBSURFACE FIBER OPTIC CONDUIT

CHAIN-LINK FENCING

LEGEND

ARCADIS GERAGHTY & MILLER

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NOVI, MICHIGAN 48375
TEL: 248/305-9400 FAX248/305-9401

RADIOMETRIC SURVEY RESULTS
CSX TRANSPORTATION
CSXT 9717003; ENV993955PJKK
INKSTER ROAD SITE
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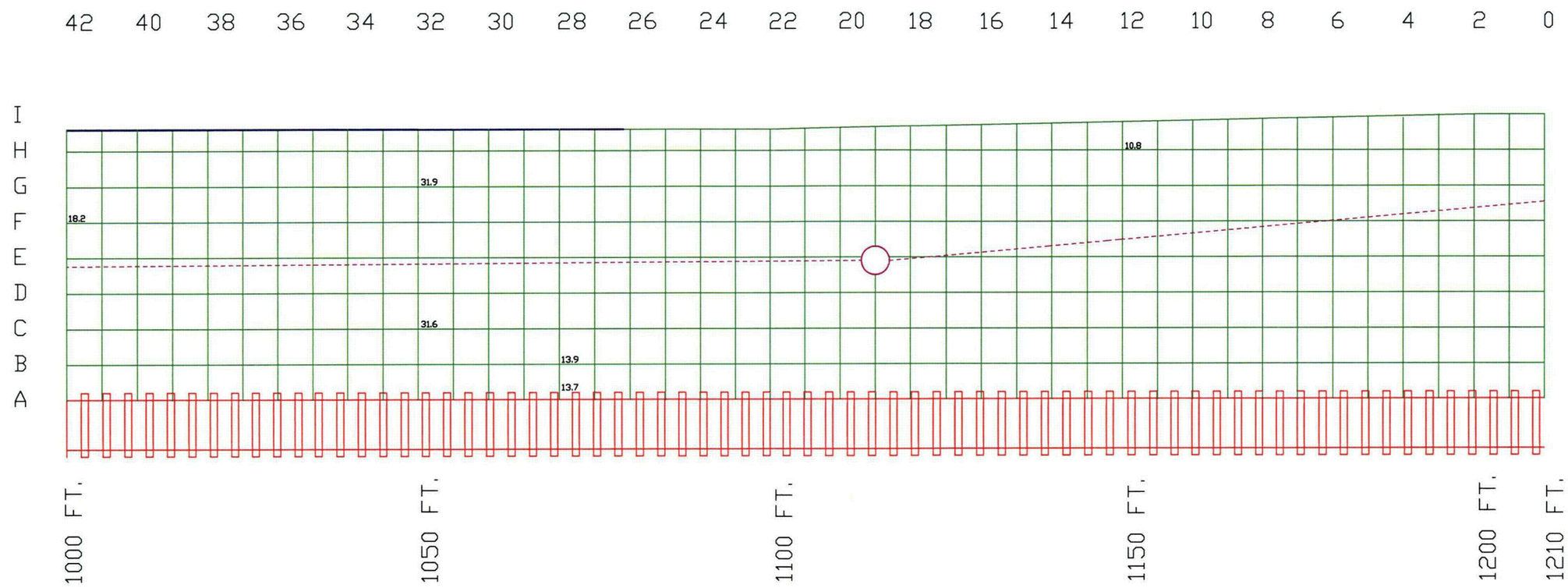
PROJECT MANAGER: K. PANCZAK	DRAWING NAME: SCAN
LEAD DESIGN PROF:	CHECKED: K. PANCZAK
PROJECT NUMBER: MI000703.0003	DRAWING NUMBER: FIGURE 3D



N

SCALE IN FEET:

0 20 40

READINGS RECORDED EVERY 10 FEET PER ROW, TAKEN FROM BOTTOM LEFT HAND CORNER.
UNITS: uR / HR

25.0

W DEEP WATER, NO READING RECORDED

LOCATION OF SUBSURFACE FIBER OPTIC CONDUIT

CHAIN-LINK FENCING

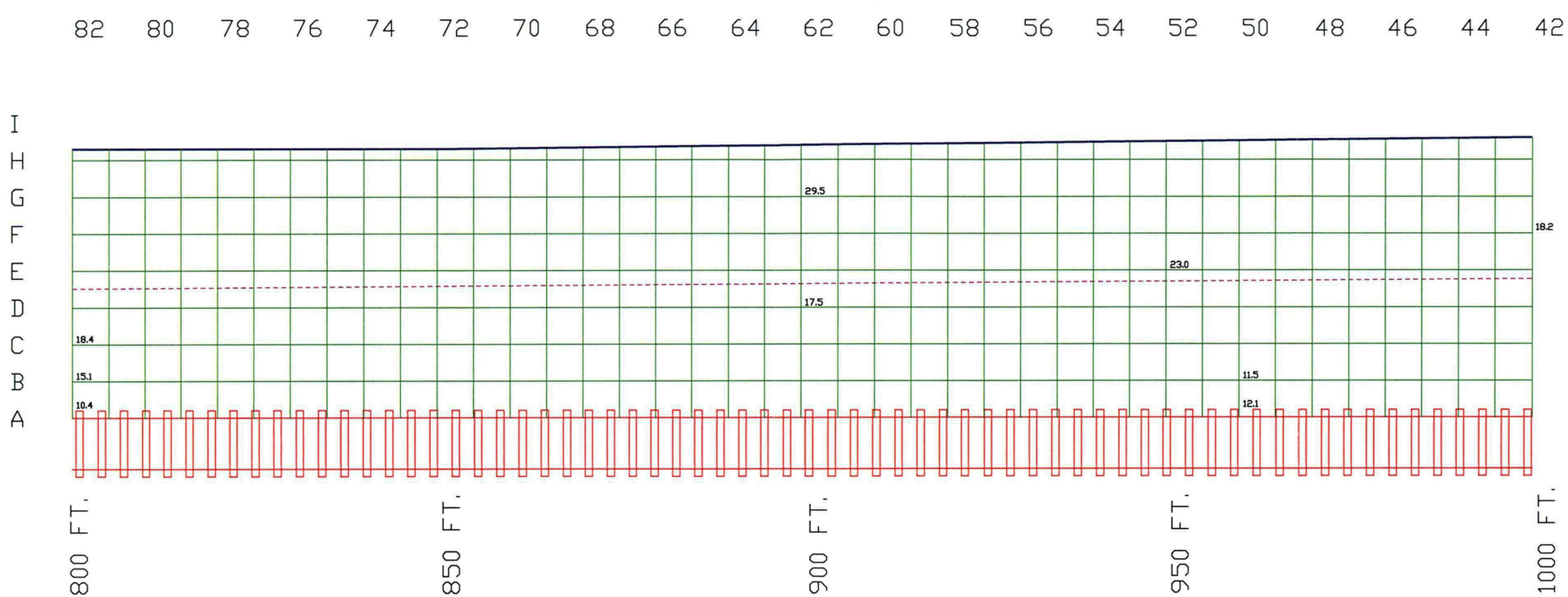
LEGEND

ARCADIS GERAGHTY & MILLER

41511 ELEVEN MILE ROAD
NOVI, MICHIGAN 48375
TEL: 248/305-9400 FAX:248/305-9401

SUBSURFACE RADIOMETRIC SURVEY RESULTS
CSX TRANSPORTATION
CSXT 9717003; ENV993955PJKK
INKSTER ROAD SITE
LIVONIA, MICHIGAN

DRAWN BY: SEAN JERIC	DRAWING DATE: 040698/053000
PROJECT MANAGER: K. PANCZAK	DRAWING NAME: SCAN
LEAD DESIGN PROF:	CHECKED: K. PANCZAK
PROJECT NUMBER: MI000703.0003	DRAWING NUMBER: FIGURE 4



SCALE IN FEET:

0 20 40

READINGS RECORDED EVERY 10 FEET PER ROW, TAKEN FROM BOTTOM LEFT HAND CORNER.
UNITS: uR / HR

25.0

LOCATION OF SUBSURFACE FIBER OPTIC CONDUIT

CHAIN-LINK FENCING

LEGEND

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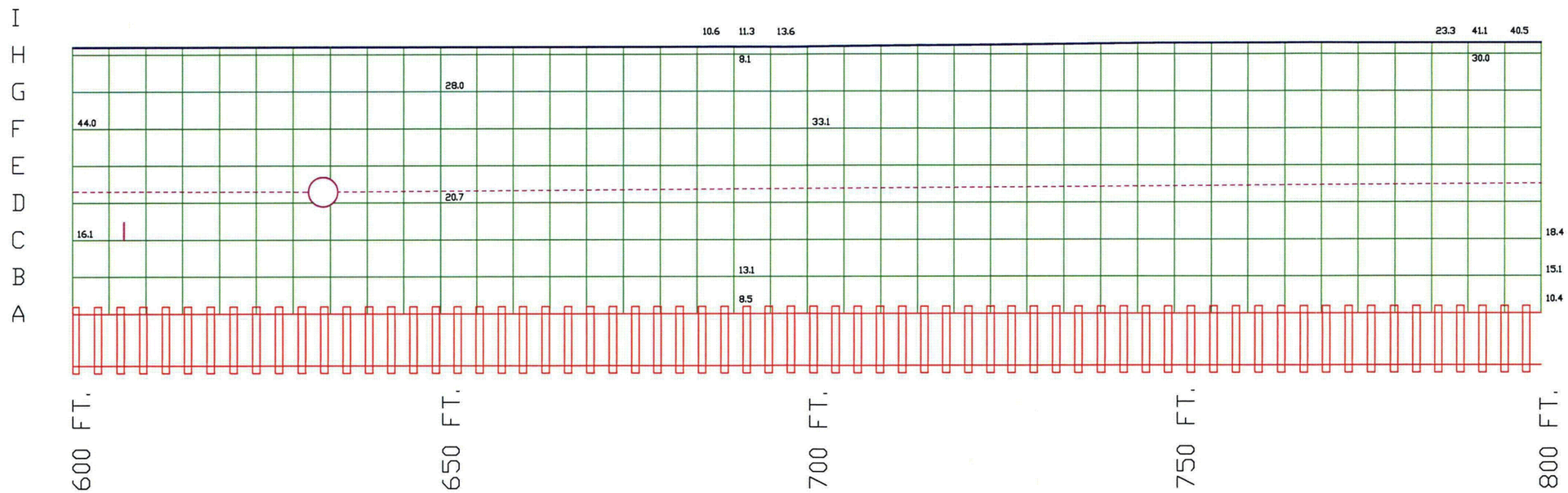
SUBSURFACE RADIOMETRIC SURVEY RESULTS CSX TRANSPORTATION CSXT 9717003; ENV993955PJKK

INKSTER ROAD SITE
LIVONIA, MICHIGAN

DRAWN BY: SEAN JERIC	DRAWING DATE: 040598/053000
PROJECT MANAGER: K. PANCZAK	DRAWING NAME: SCAN
LEAD DESIGN PROF:	CHECKED: K. PANCZAK
PROJECT NUMBER: MI000703.0003	DRAWING NUMBER: FIGURE 4A



N

SCALE IN FEET:

0 20 40

25.0 READINGS RECORDED EVERY 10 FEET PER ROW, TAKEN FROM BOTTOM LEFT HAND CORNER.
UNITS: uR / HR

LOCATION OF SUBSURFACE FIBER OPTIC CONDUIT

CHAIN-LINK FENCING

LEGEND

ARCADIS GERAGHTY & MILLER

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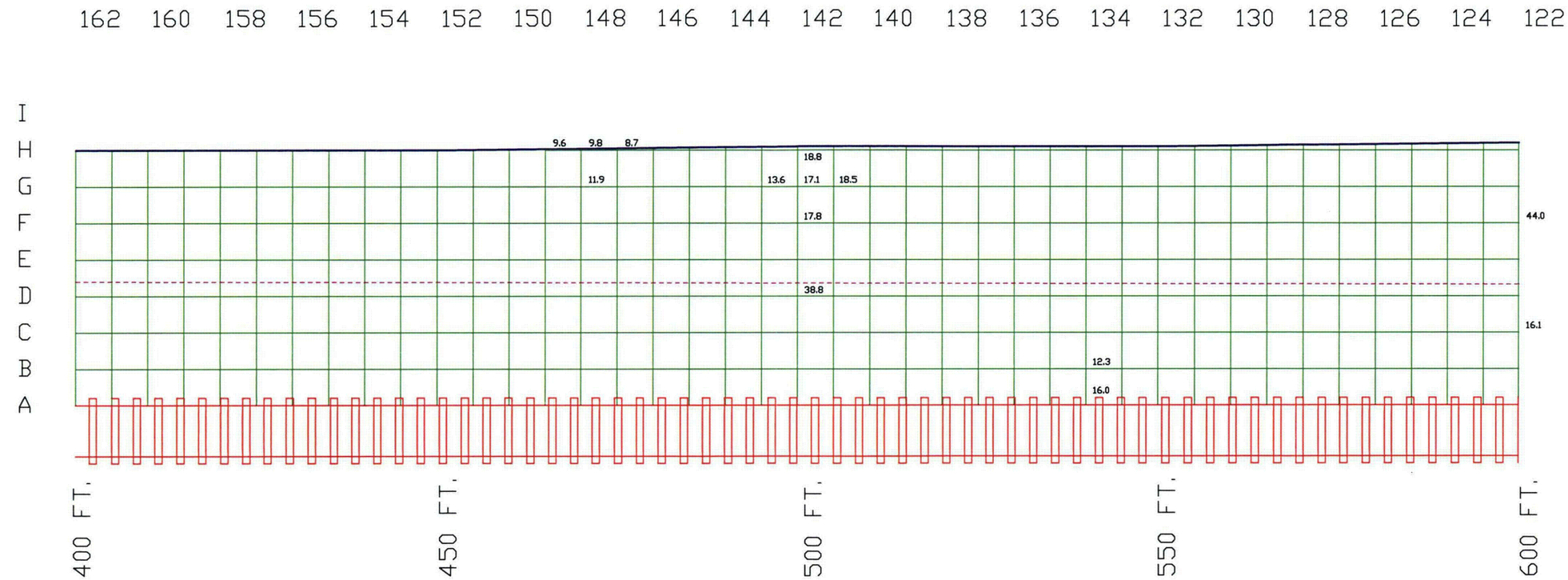
SUBSURFACE RADIOMETRIC SURVEY RESULTS
CSX TRANSPORTATION
CSXT 9717003; ENV993955PJKK
INKSTER ROAD SITE
LIVONIA, MICHIGAN

DRAWN BY: SEAN JERIC	DRAWING DATE: 040598/053000
PROJECT MANAGER: K. PANCZAK	DRAWING NAME: SCAN
LEAD DESIGN PROF:	CHECKED: K. PANCZAK
PROJECT NUMBER: MI000703.0003	DRAWING NUMBER: FIGURE 4B



N

SCALE IN FEET:

0 20 40

READINGS RECORDED EVERY 10 FEET PER ROW, TAKEN FROM BOTTOM LEFT HAND CORNER.
25.0 UNITS: uR / HR
LOCATION OF SUBSURFACE FIBER OPTIC CONDUIT
CHAIN-LINK FENCING

LEGEND

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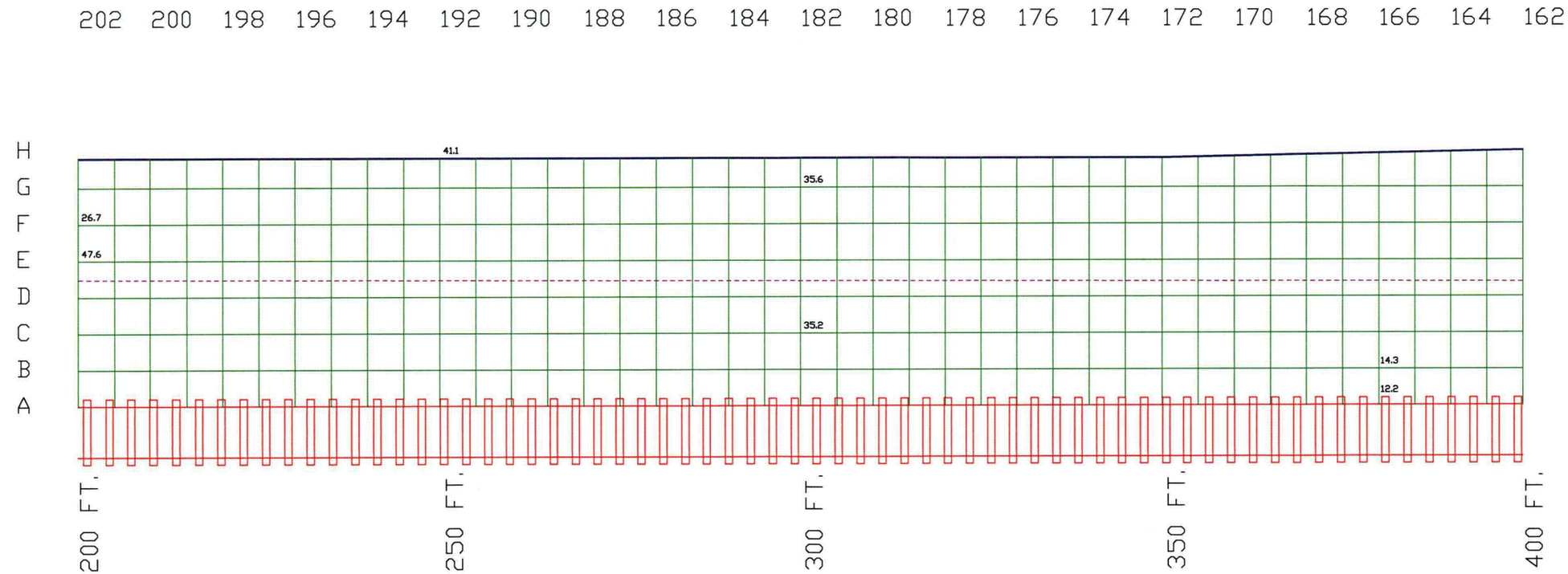
SUBSURFACE RADIOMETRIC SURVEY RESULTS
CSX TRANSPORTATION
CSXT 9717003; ENV993955PJKK
INKSTER ROAD SITE
LIVONIA, MICHIGAN

DRAWN BY: SEAN JERIC	DRAWING DATE: 040598/053000
PROJECT MANAGER: K. PANCZAK	DRAWING NAME: SCAN
LEAD DESIGN PROF:	CHECKED: K. PANCZAK
PROJECT NUMBER: MI000703.0003	DRAWING NUMBER: FIGURE 4C



SCALE IN FEET:

0 20 40

READINGS RECORDED EVERY 10 FEET PER ROW, TAKEN FROM BOTTOM LEFT HAND CORNER.
UNITS: uR / HR

25.0

LOCATION OF SUBSURFACE FIBER OPTIC CONDUIT

CHAIN-LINK FENCING

LEGEND

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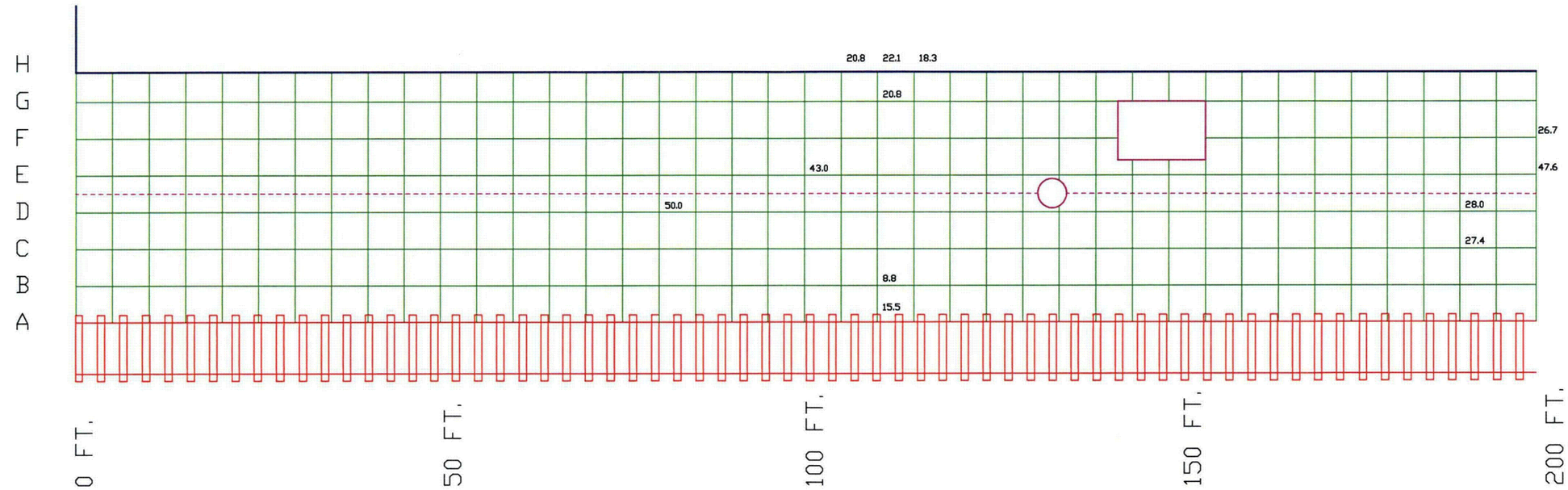
SUBSURFACE RADIOMETRIC SURVEY RESULTS
CSX TRANSPORTATION
CSXT 9717003; ENV993955PJKK
INKSTER ROAD SITE
LIVONIA, MICHIGAN

DRAWN BY: SEAN JERIC	DRAWING DATE: 040598/053000
PROJECT MANAGER: K. PANCZAK	DRAWING NAME: SCAN
LEAD DESIGN PROF:	CHECKED: K. PANCZAK
PROJECT NUMBER: MI000703.0003	DRAWING NUMBER: FIGURE 4D



SCALE IN FEET:

0 20 40

READINGS RECORDED EVERY 10 FEET PER ROW, TAKEN FROM BOTTOM LEFT HAND CORNER.
25.0 UNITS: uR / HR
B BLOCKED AREA, NO READING RECORDED
LOCATION OF SUBSURFACE FIBER OPTIC CONDUIT
CHAIN-LINK FENCING

LEGEND

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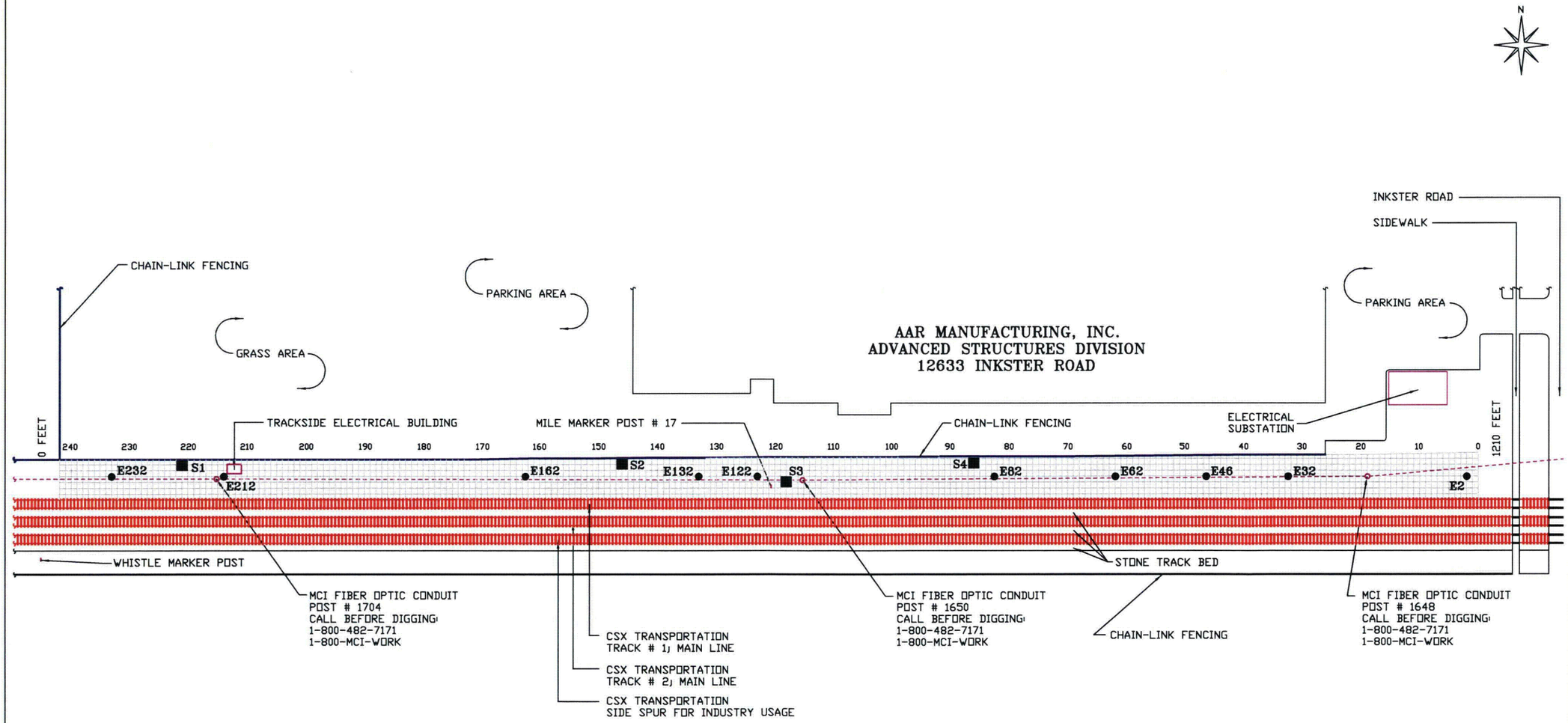
SUBSURFACE RADIOMETRIC SURVEY RESULTS
CSX TRANSPORTATION
CSXT 9717003; ENV993955PJKK
INKSTER ROAD SITE
LIVONIA, MICHIGAN

DRAWN BY: SEAN JERIC	DRAWING DATE: 022198/053000
PROJECT MANAGER: K. PANCZAK	DRAWING NAME: SCAN
LEAD DESIGN PROF:	CHECKED: K. PANCZAK
PROJECT NUMBER: MI000703.0003	DRAWING NUMBER: FIGURE 4E



SCALE IN FEET:

0 20 40 80

RADIOMETRIC SURVEY GRID.
GRID CONSTRUCTED UTILIZING 5 FOOT BY 5 FOOT SQUARES.
APPROXIMATE GRID DIMENSIONS: 1210 FEET LENGTH (E TO W), 34 TO 40 FEET WIDE (N TO S).

NO.	DATE	REVISION DESCRIPTION	BY	CKD

ARCADIS GERAGHTY & MILLER
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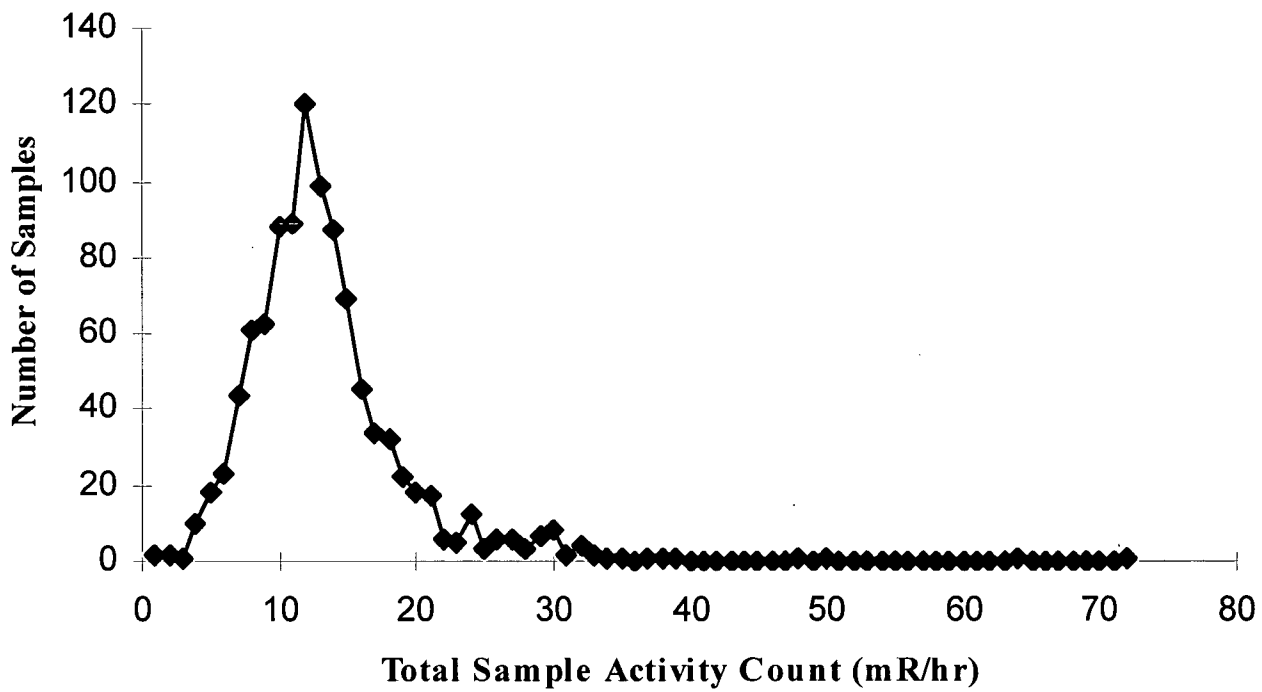
SAMPLE LOCATIONS
CSX TRANSPORTATION
CSXT 9717003; ENV993955PJKK
INKSTER ROAD SITE
LIVONIA, MICHIGAN

DRAWN BY: SEAN JERIC	DRAWING DATE: 022198/053000
PROJECT MANAGER: K. PANCZAK	DRAWING NAME: LAYOUT
LEAD DESIGN PROF:	CHECKED: K. PANCZAK
PROJECT NUMBER: MI000703.0003	DRAWING NUMBER: FIGURE 6



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DISTRIBUTION OF FEBRUARY 1998
FIELD-SCREENING MEASUREMENTS
CSX TRANSPORTATION
CSXT 9717003; ENV993955PJKK
INKSTER ROAD SITE
LIVONIA, MICHIGAN

DATE	PROJECT MANAGER	DRAWING NAME
30MAY00	K. PANCZAK	GRAPH
DRAWN	LEAD DESIGN PROF.	CHECKED
S. JERIC		K. PANCZAK
PROJECT NUMBER		FIGURE NUMBER
MI000703.0003.00001		5