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REMEDIAL INVESTIGATION REPORT
FOR
FISHER-CALO CHEMICAL SITE
KINGSBURY, INDIANA

MAY 1989

VOLUME II OF III

REM II

PERFORMANCE OF REMEDIAL RESPONSE ACTIVITIES AT UNCONTROLLED HAZARDOUS WASTE SITES

U.S. EPA CONTRACT NO. 68-01-6939

CDM Federal Programs Corporation
CAMP DRESSER & McKEE INC.
ROY F. WESTON INC.
WOODWARD-CLYDE CONSULTANTS
CLEMENT ASSOCIATES, INC.
ICF INCORPORATED
C.C. JOHNSON & MALHOTRA, P.C.

REMEDIAL INVESTIGATION REPORT
FOR
FISHER-CALO CHEMICAL SITE
KINGSBURY, INDIANA

MAY 1989

VOLUME II OF III

20915/04

VOLUME II

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APPENDIX B TABLES AND SITE DATA

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B-2 Hydraulic Conductivity Results
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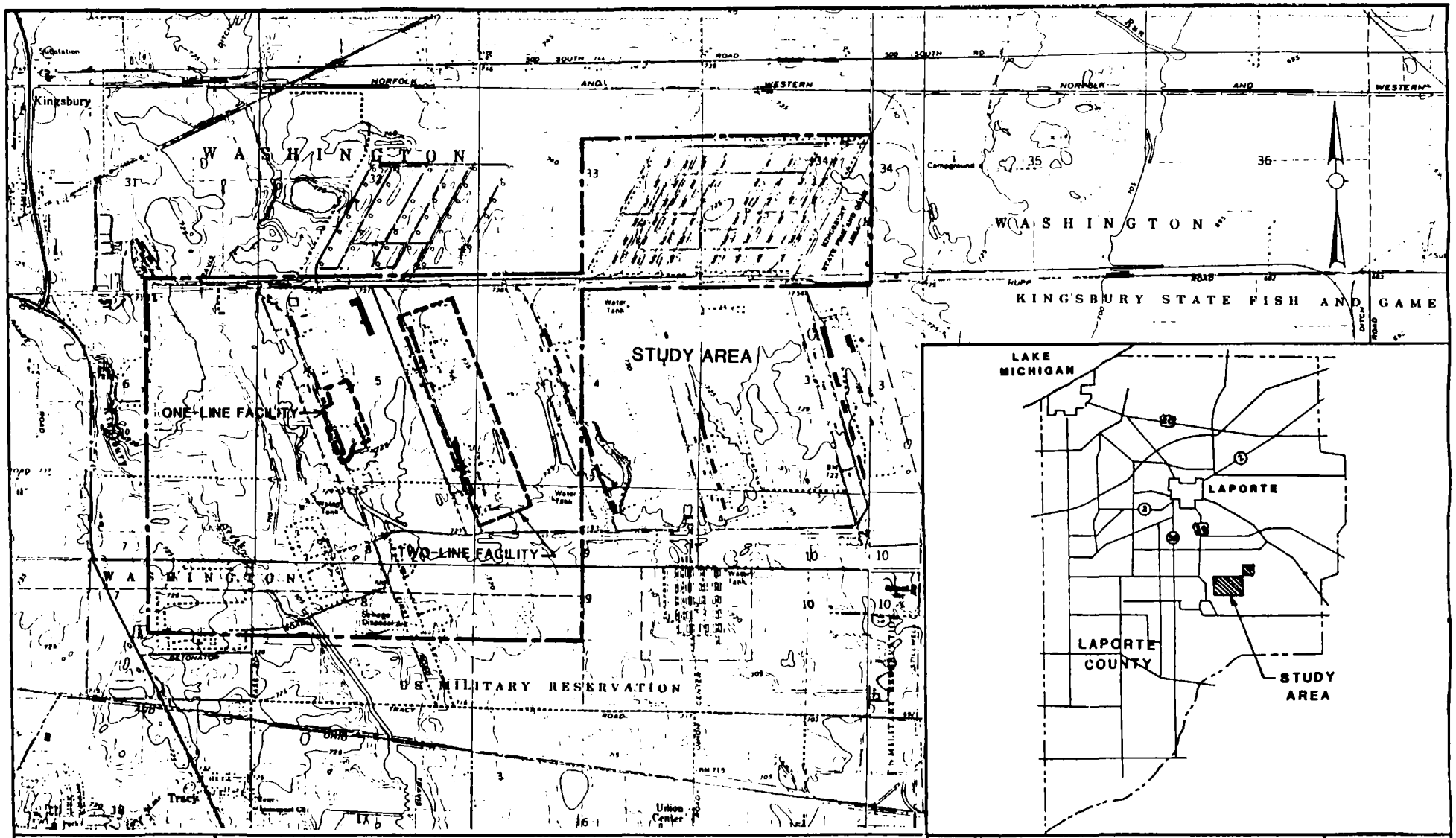

SITE AREA AND LOCATION MAP

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Chicago, Ill. 60606

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FIG. NO.
1.1-1

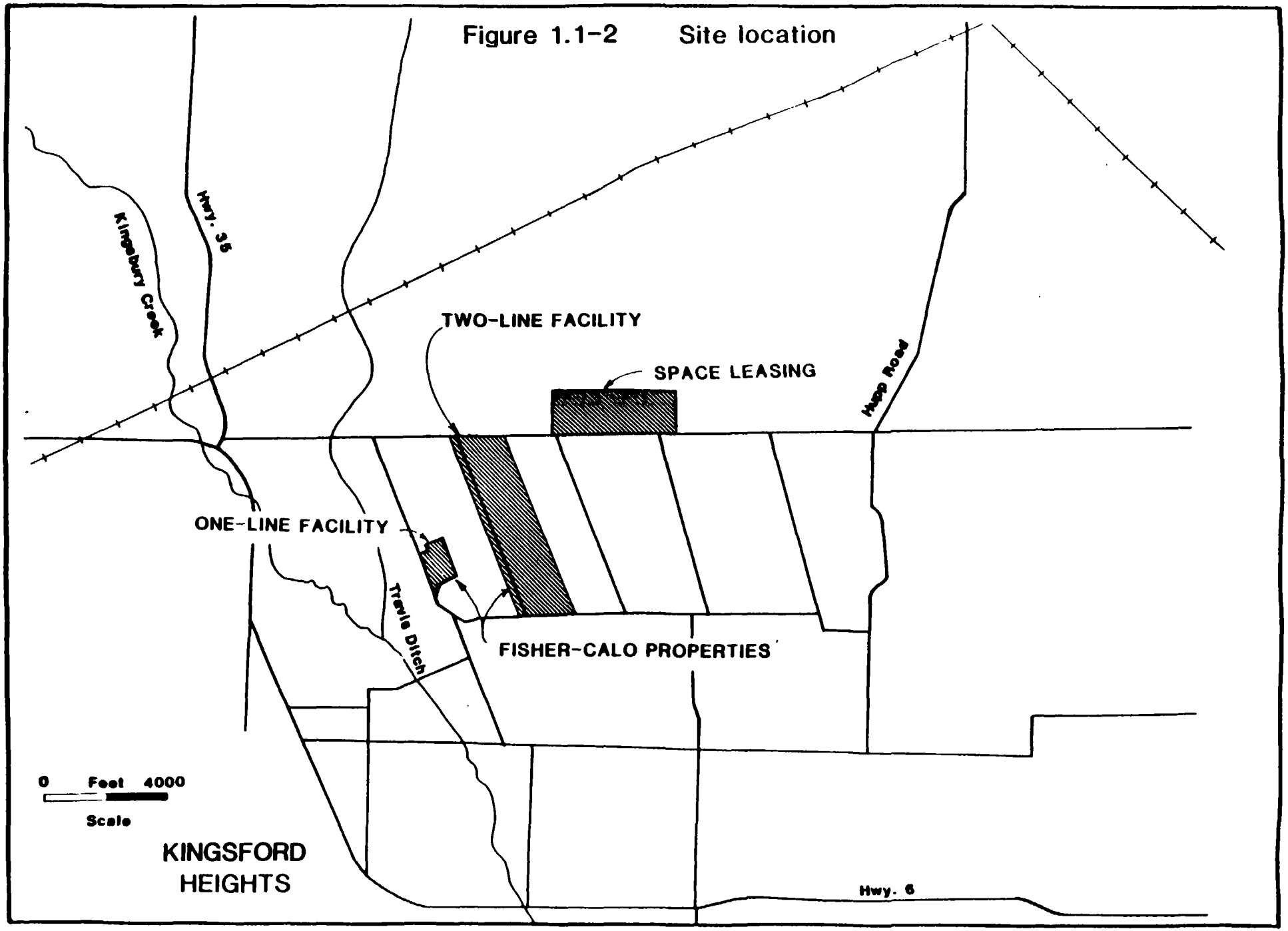

Figure 1.1-2 Site location

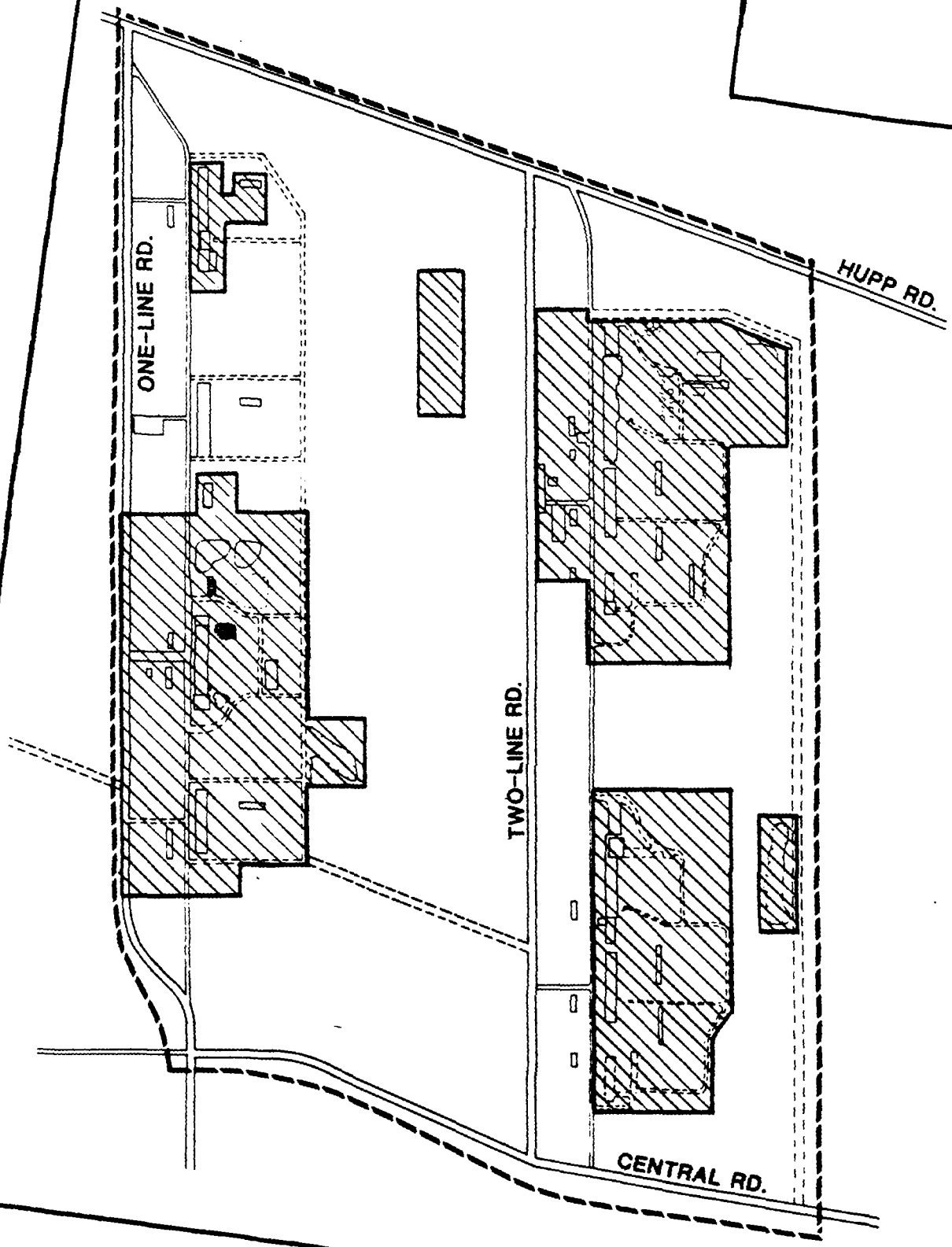

FIGURE 1.2-1 SUSPECTED DISPOSAL/STORAGE AREAS

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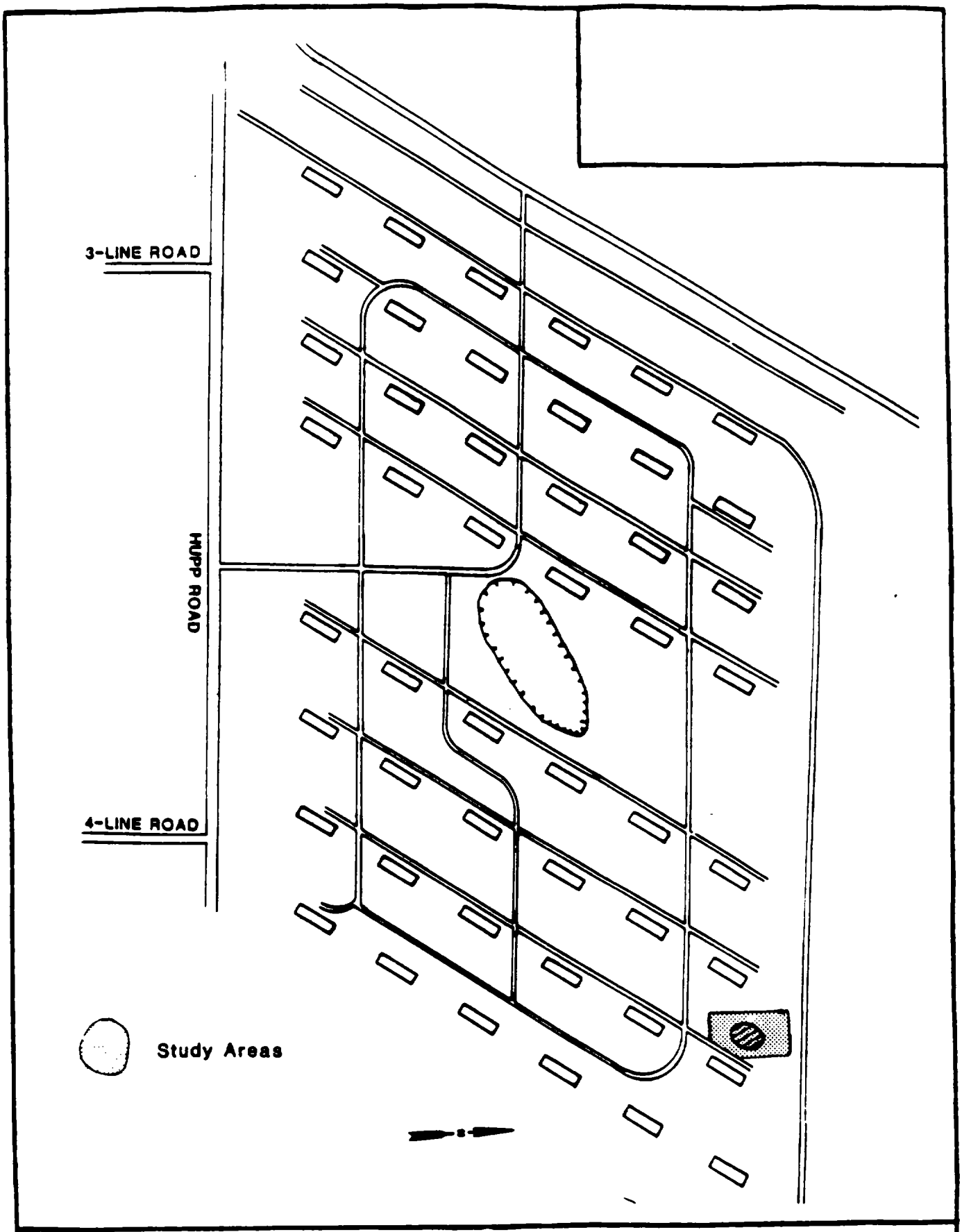
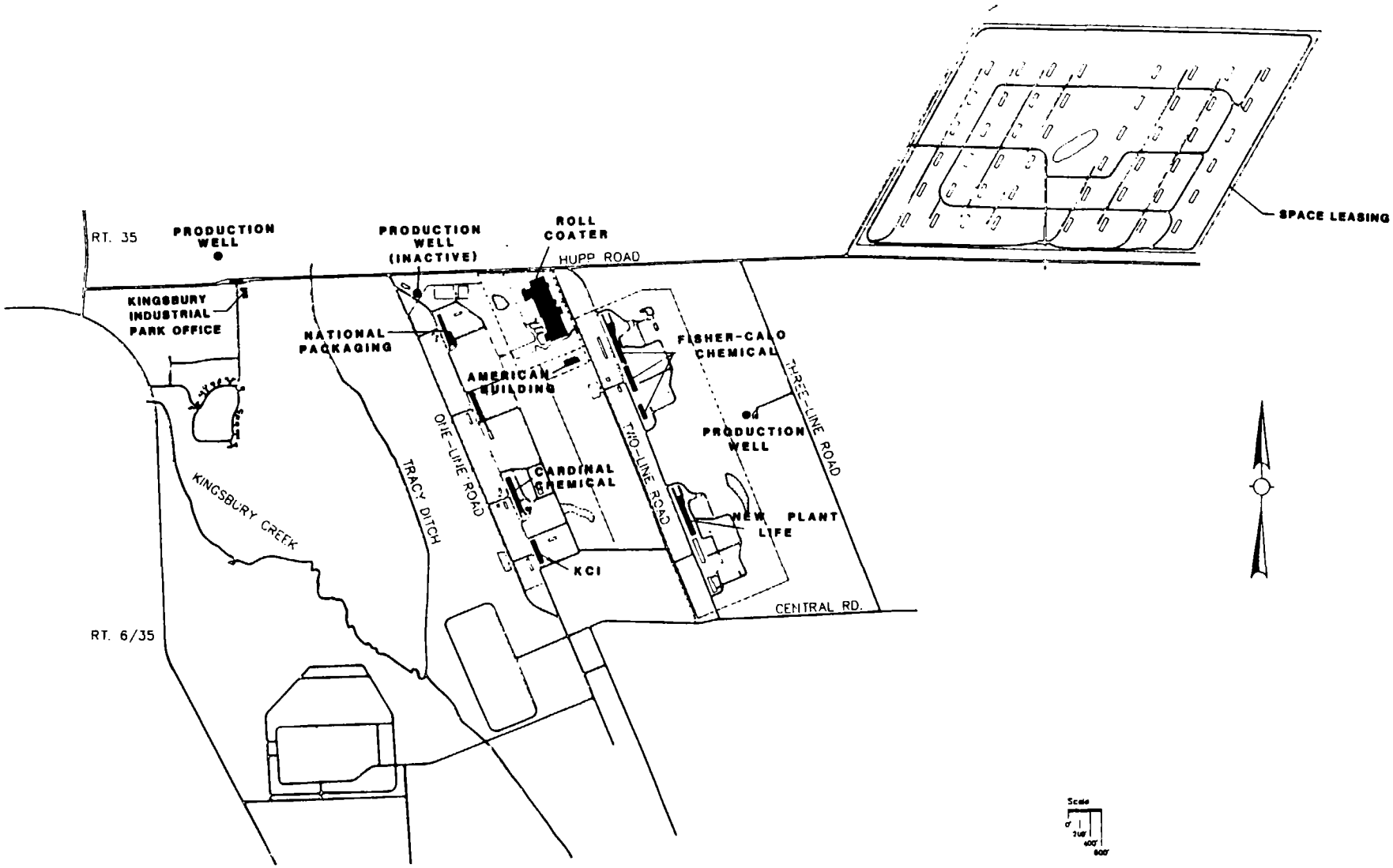


FIGURE 1.2-2 ADDITIONAL SUSPECTED DISPOSAL STORAGE AREA



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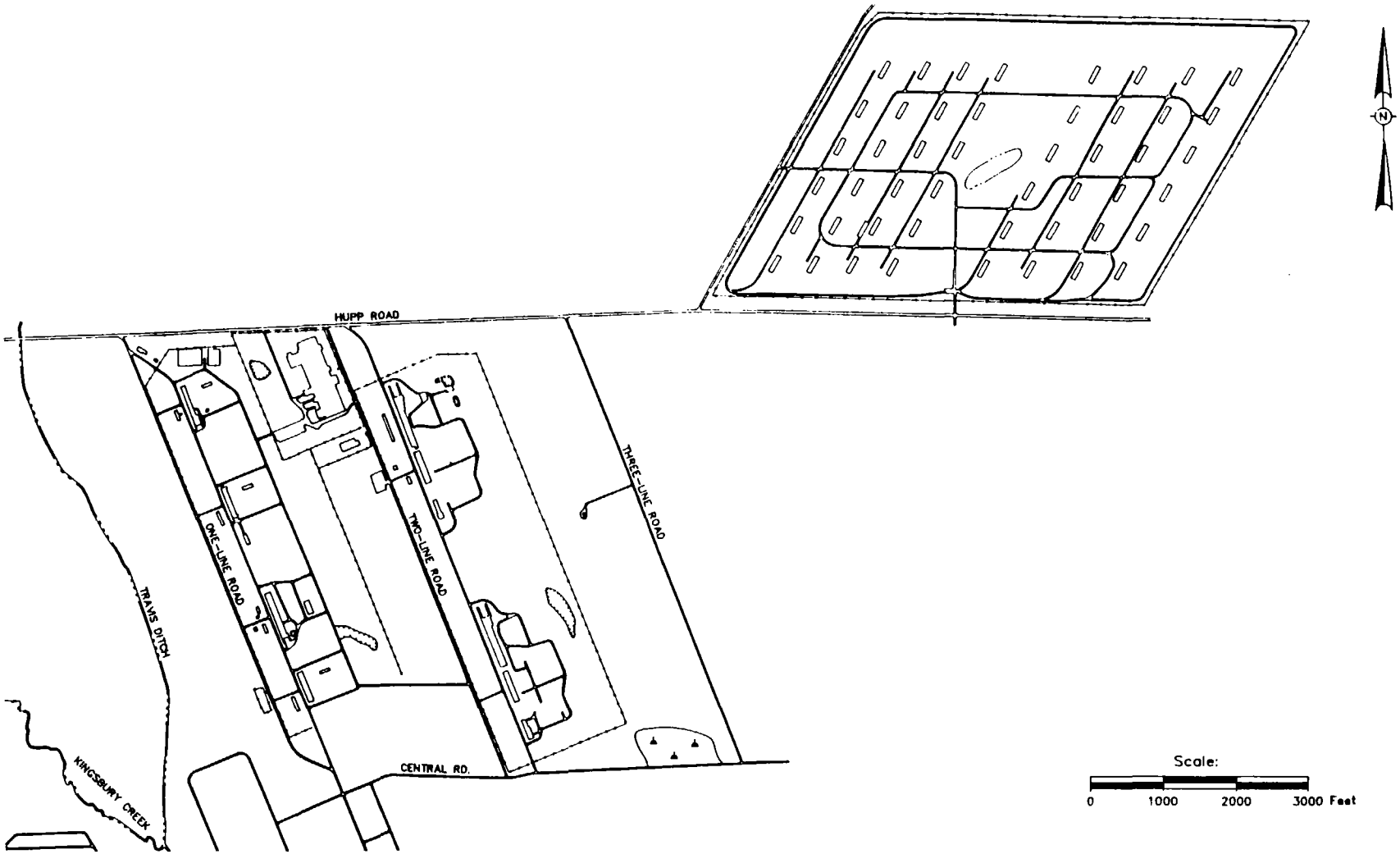
SITE FACILITIES MAP

FIGURE NO.

1.2-3



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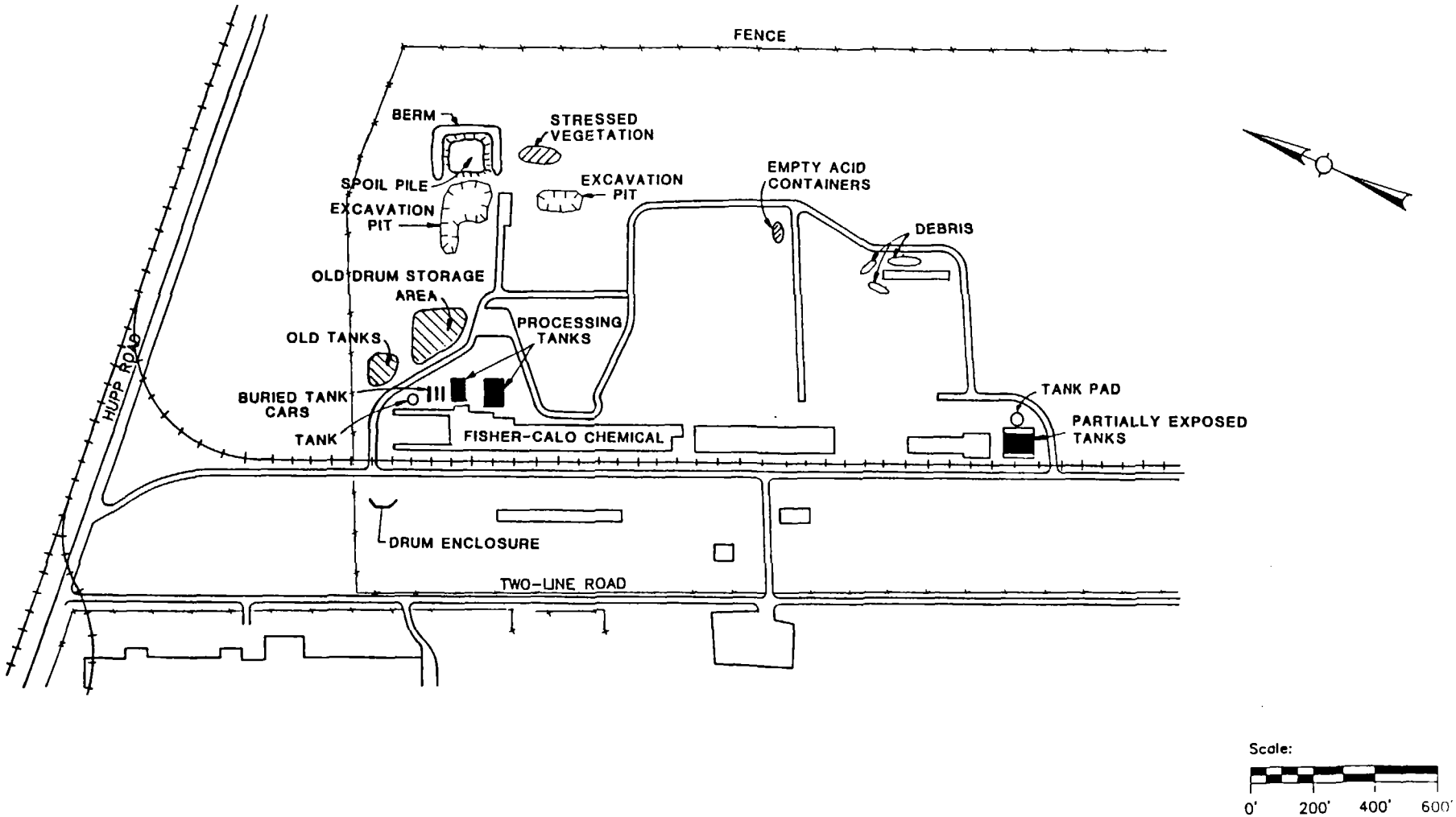
SITE AREA MAP

FIGURE NO

1.2-4



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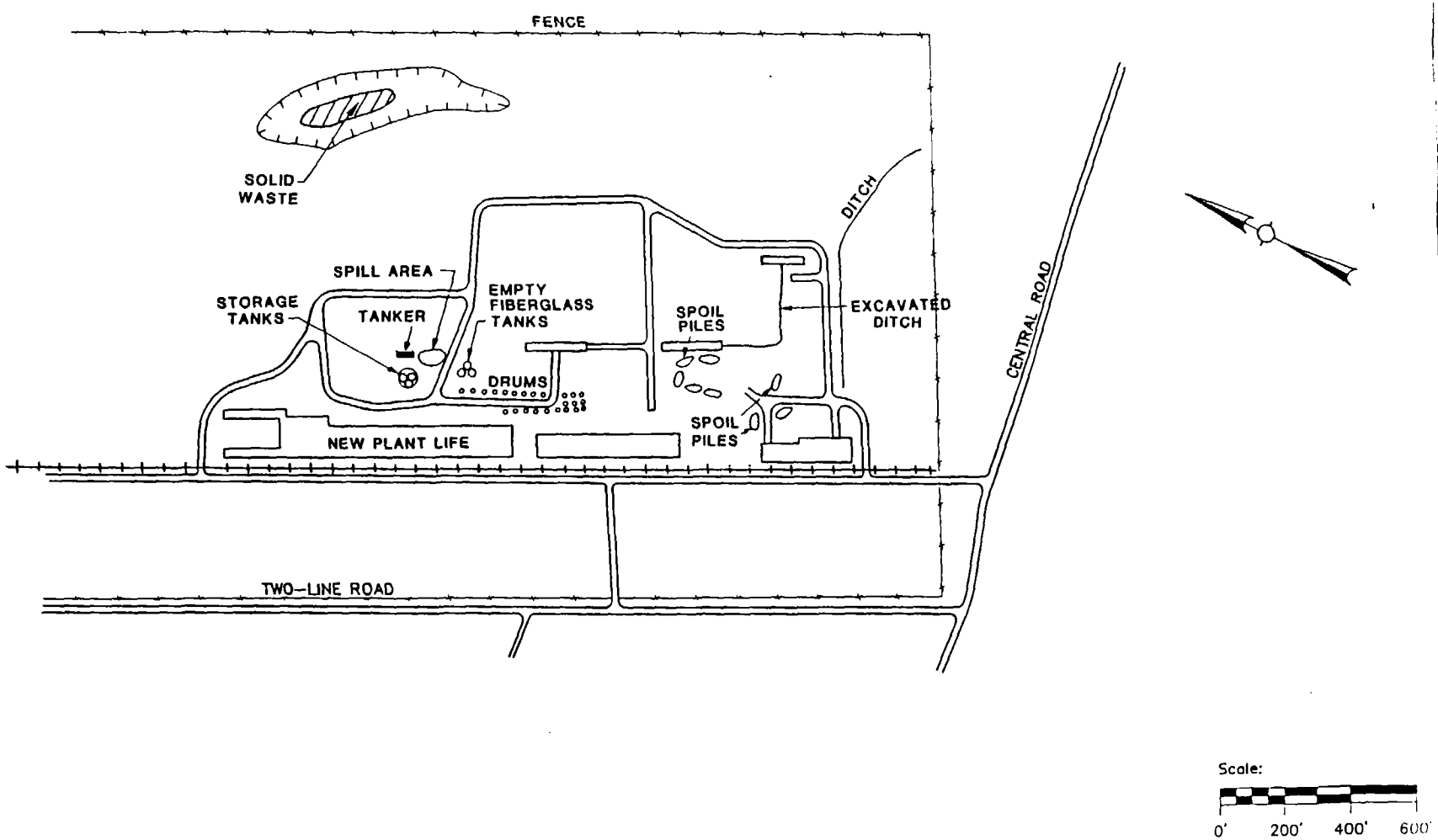
STUDY AREA A – FISHER–CALO PLANT

SITE FEATURES MAP

FIGURE NO.
1.2-5



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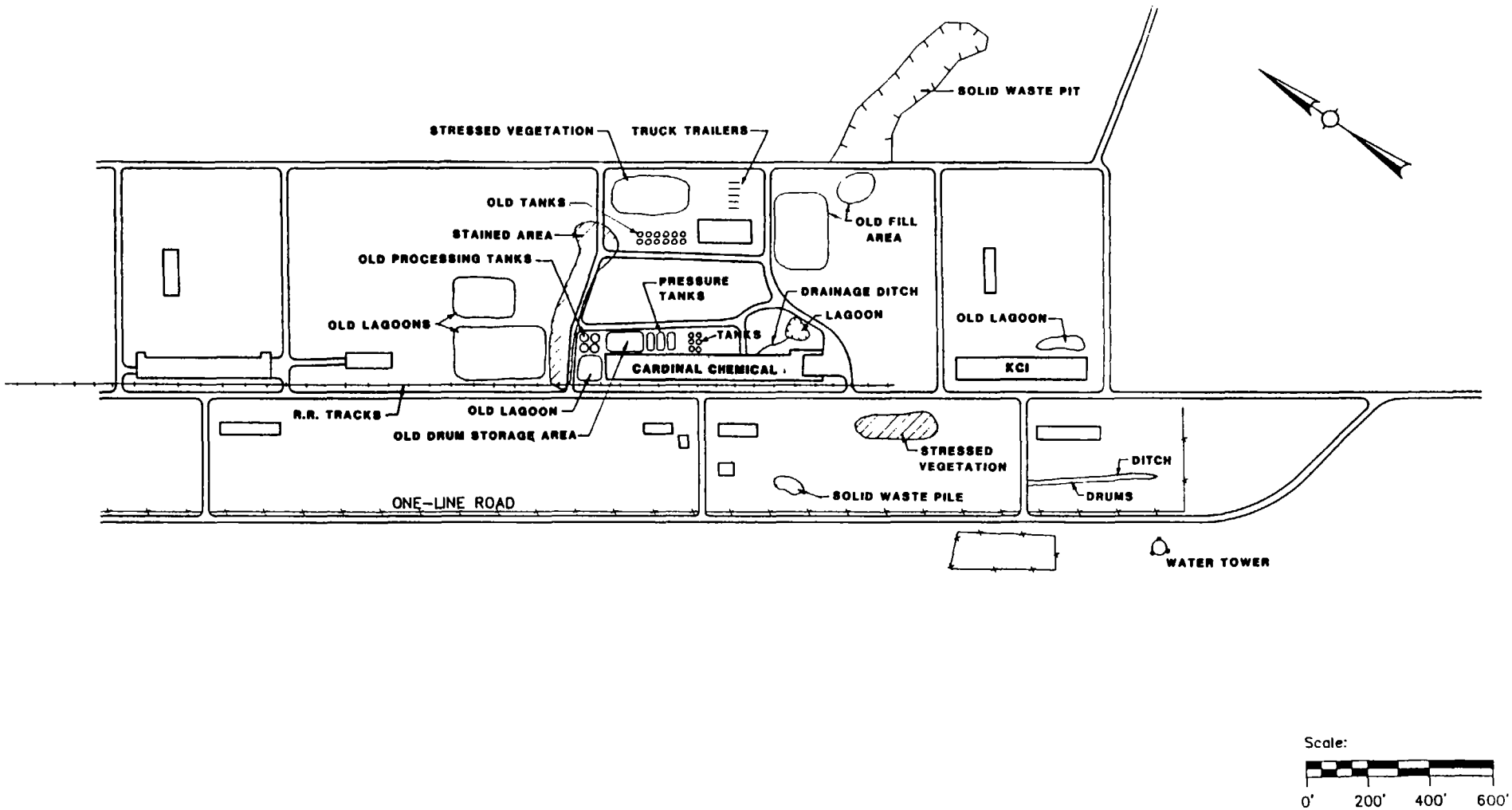
STUDY AREA B – NEW PLANT LIFE

SITE FEATURES MAP

FIGURE NO
1.2-6



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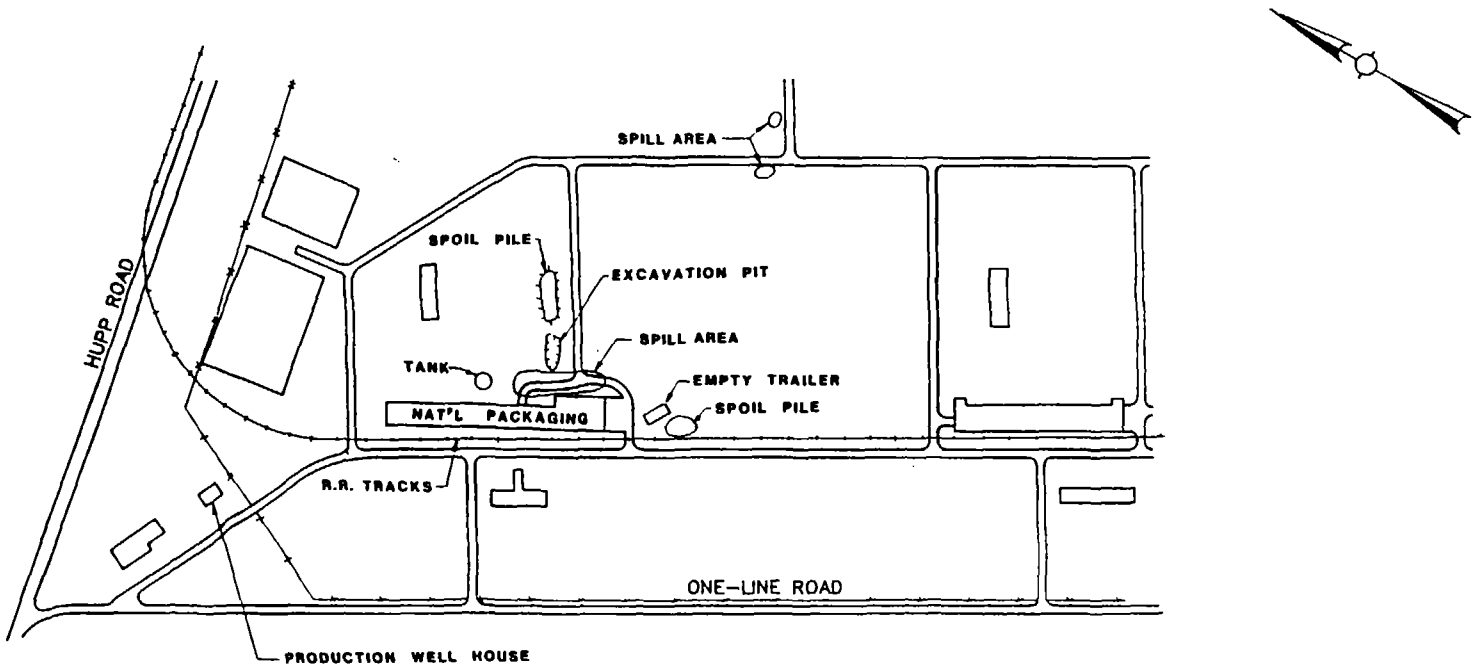
STUDY AREA C – CARDINAL CHEMICAL

SITE FEATURES MAP

FIGURE NO.
1.2-7



Scale:

0' 200' 400' 600'

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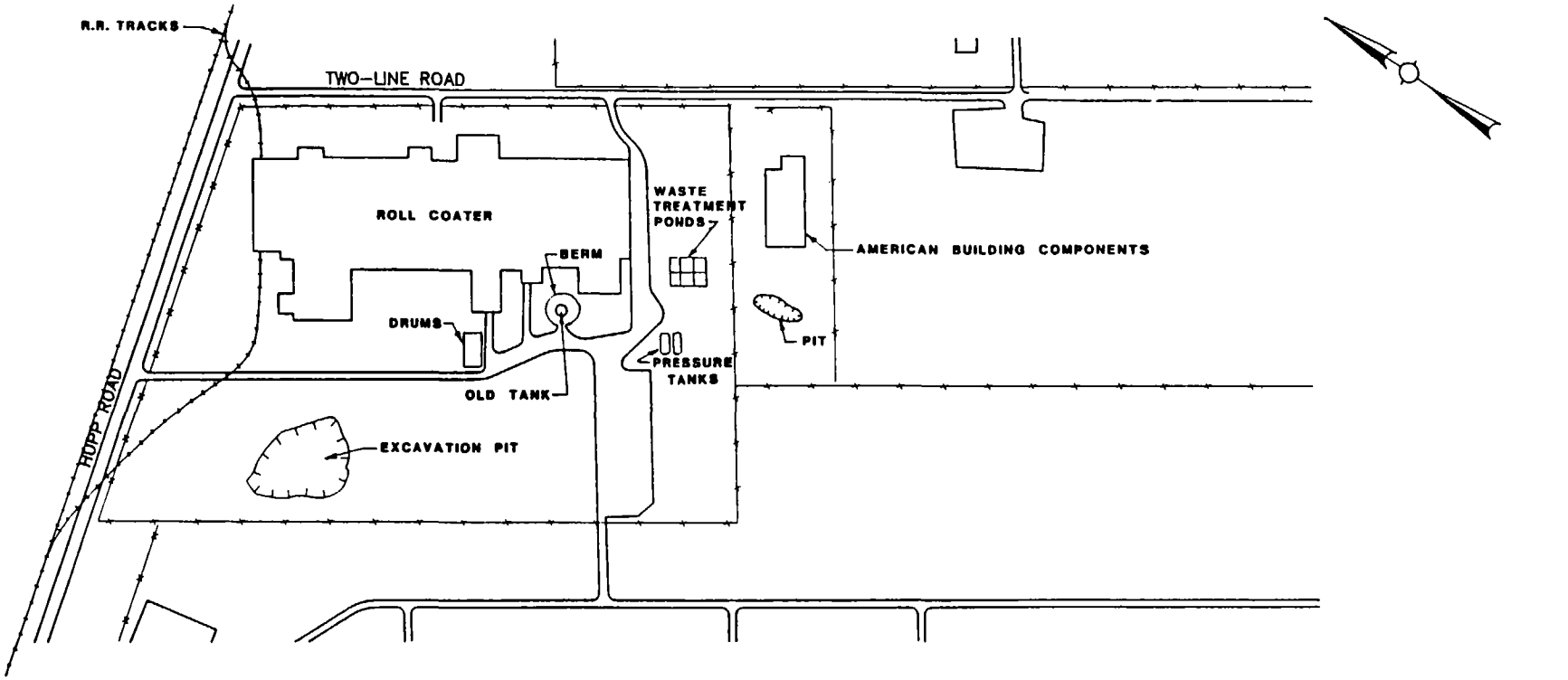
STUDY AREA D –
NATIONAL PACKAGING

SITE FEATURES MAP

FIGURE NO.

1.2-8



Scale:

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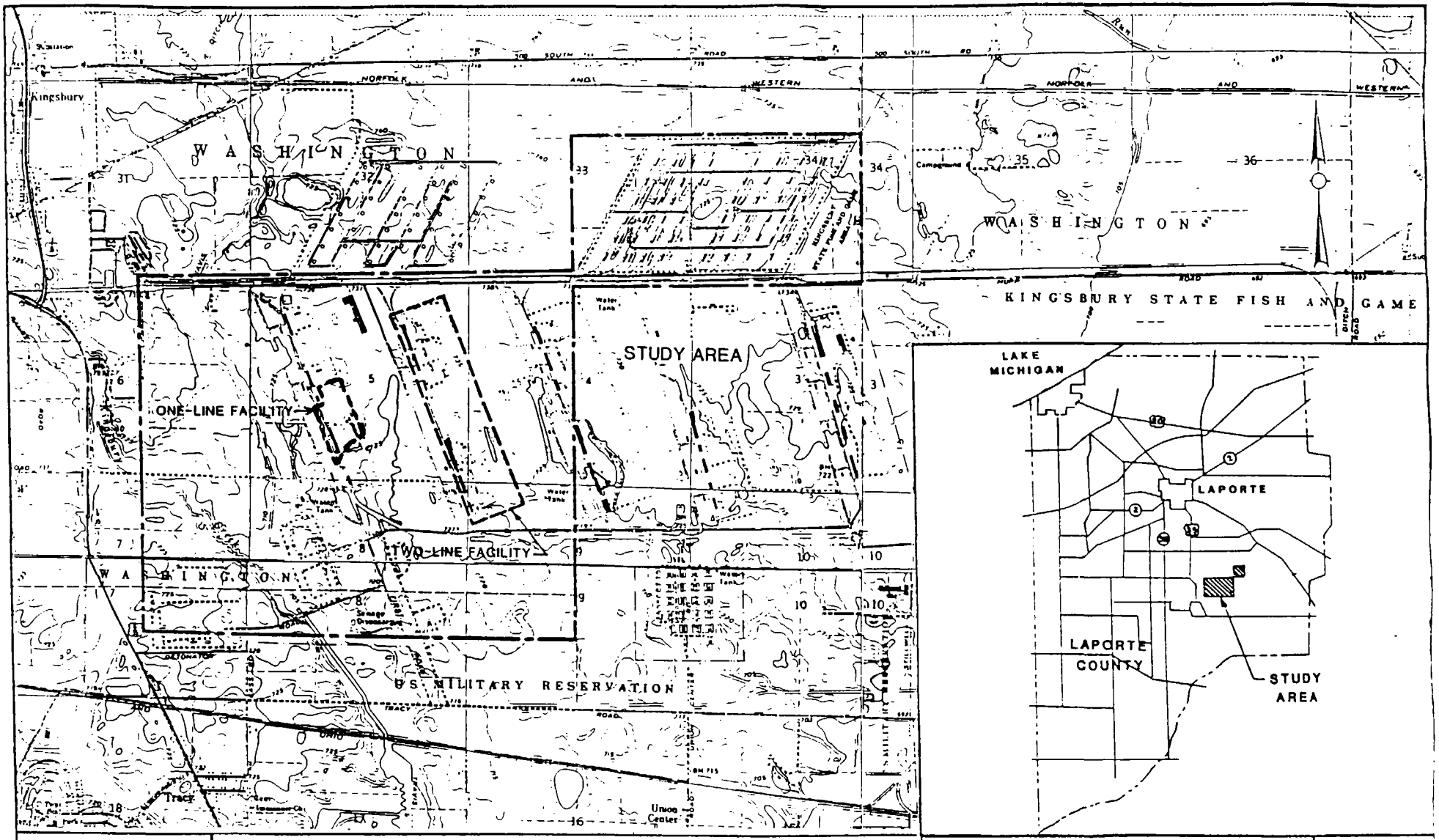
STUDY AREA E – ROLL-COATER

SITE FEATURES MAP

FIGURE NO.

1.2-9



SITE AREA AND LOCATION MAP

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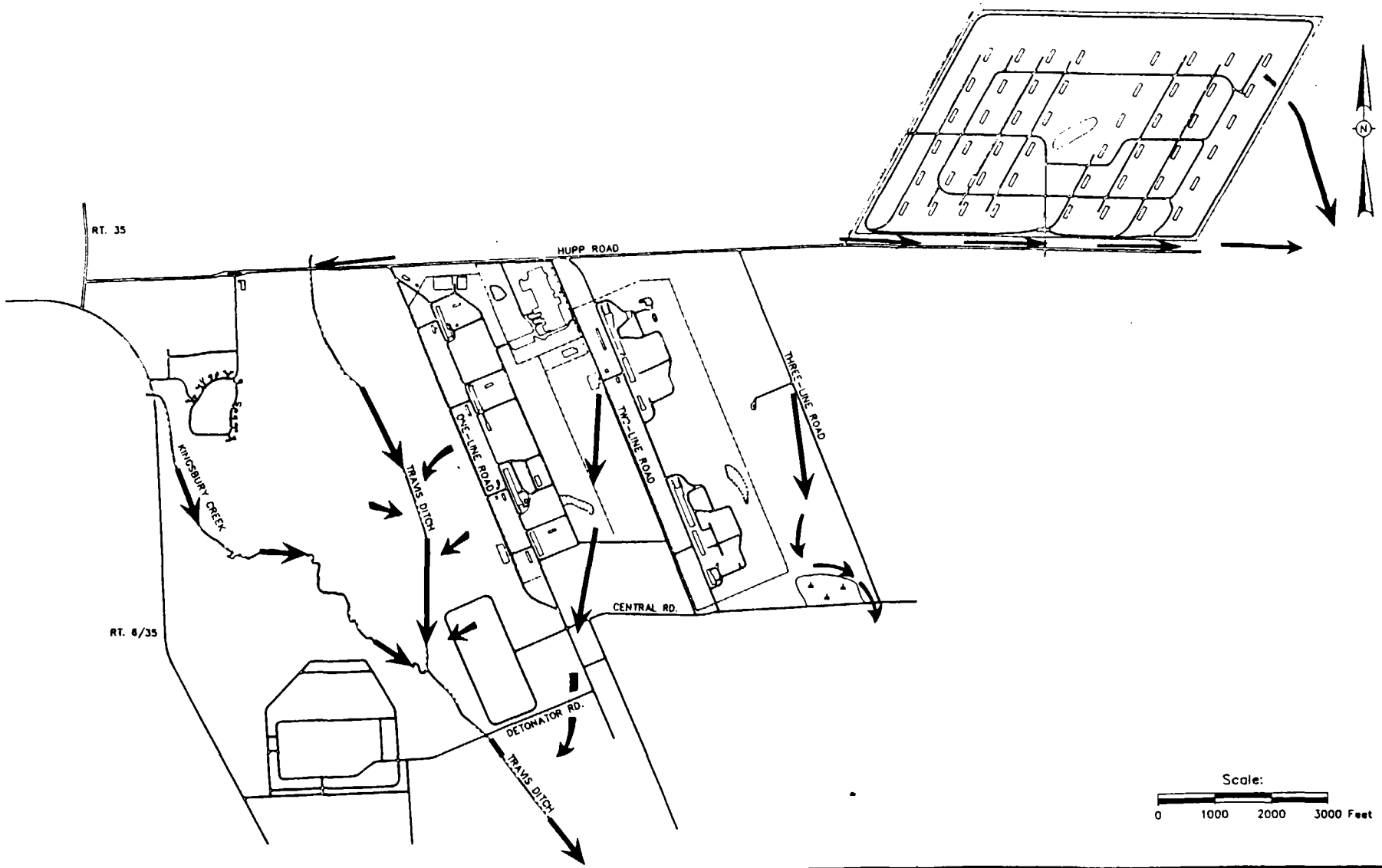
FIG. NO

2.2-1



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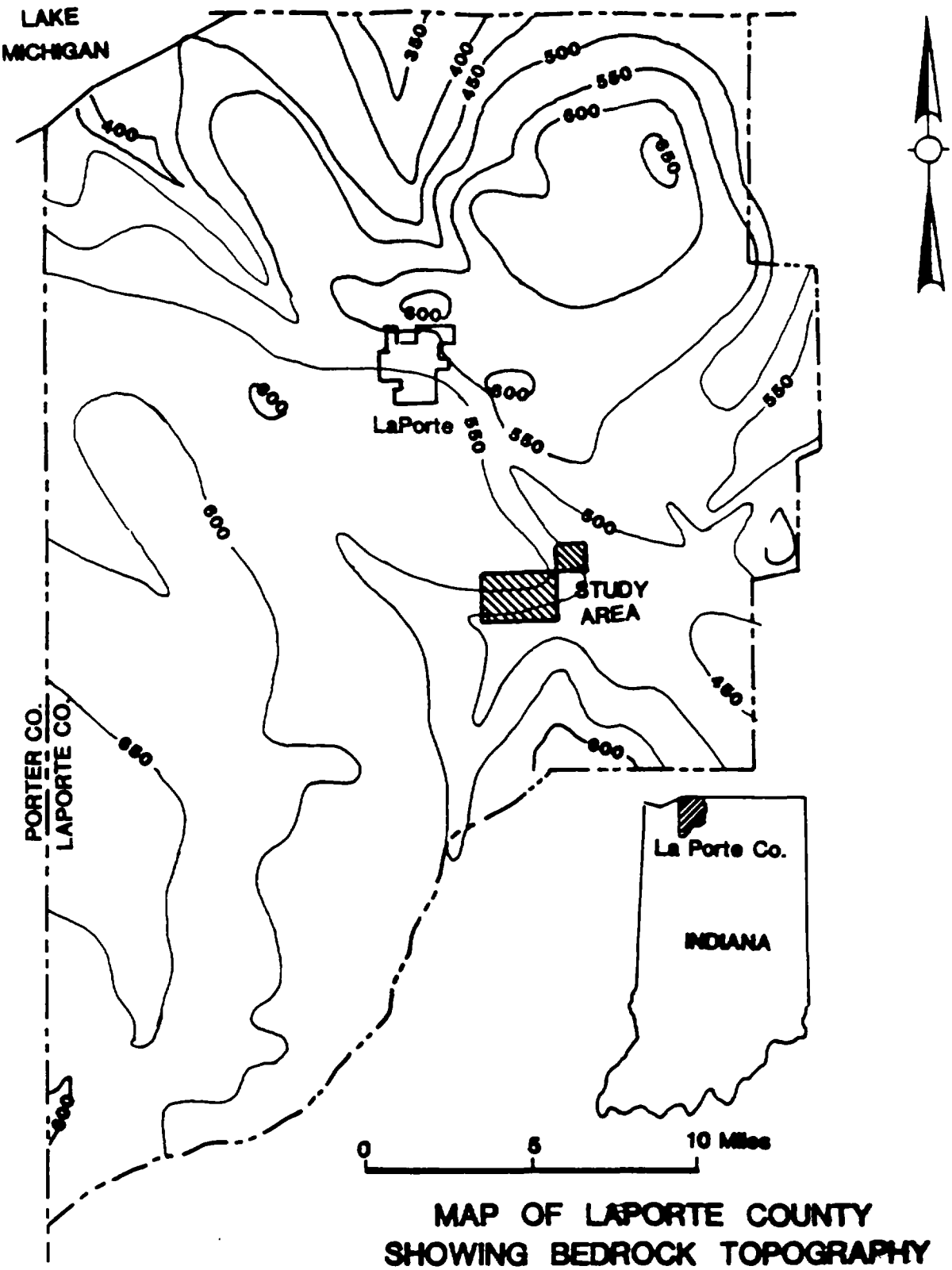
SITE SURFACE DRAINAGE

FIGURE NO.

2.4-1



MAP OF LAPORTE COUNTY
SHOWING BEDROCK TOPOGRAPHY

(HILL ET AL., 1979)

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FIG. NO.
2.5-1

503200

ERA	SYSTEM	STRATIGRAPHIC UNIT		DOMINANT LITHOLOGY	THICKNESS IN FEET
CENOZOIC	QUATERNARY	Glacial drift		Sand, gravel, and clay	25-350
	MISSISSIPPIAN	Ellsworth Sh.			
	DEVONIAN	Antrim Sh.		Shale	25-290
		Traverse Fm. Detroit River Fm.		Limestone, dolomite, anhydrite, and gypsum	110-190
PALEOZOIC	SILURIAN	Salina Fm. Wabash Fm. Louisville Ls. Salamonie Dol. Brassfield Ls.		Dolomite and limestone	450-550
	ORDOVICIAN	Maquoketa Gr.		Shale and limestone	240-355
		Trenton Ls. Black River Ls.		Limestone and dolomite	310-360
		St. Peter Ss.		Sandstone	50-100
		Knox Dol.		Dolomite	275-475
				No reliable data below this depth in LaPorte County	
	CAMBRIAN	Franconia Fm.		Dolomite and sandstone	25-100
		Ironton Ss.		Dolomite and sandstone	50-100
		Galesville Ss.		Sandstone	130-190
		Eau Claire Fm.		Shale, dolomite, and sandstone	300-450
		Mount Simon Ss.		Sandstone	1500-2000
PRECAMBRIAN				Granite	

(HILL ET AL., 1979)

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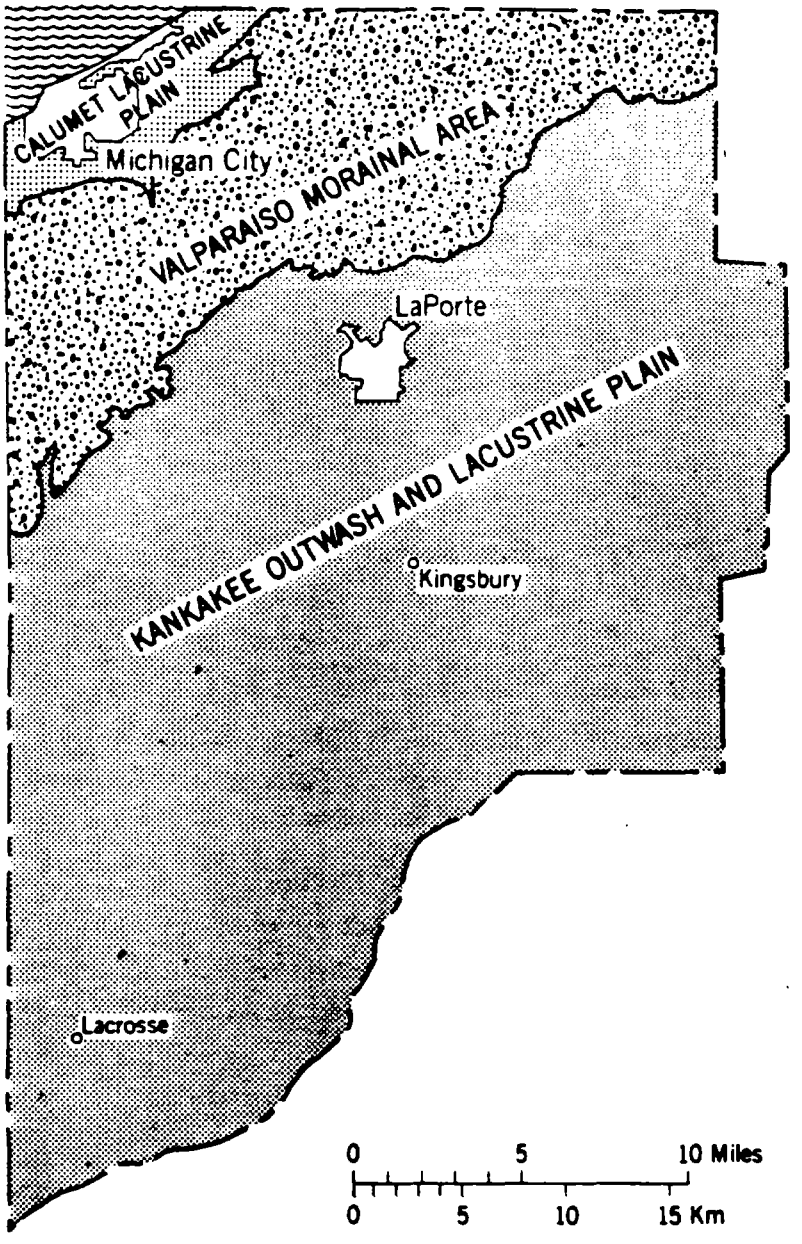
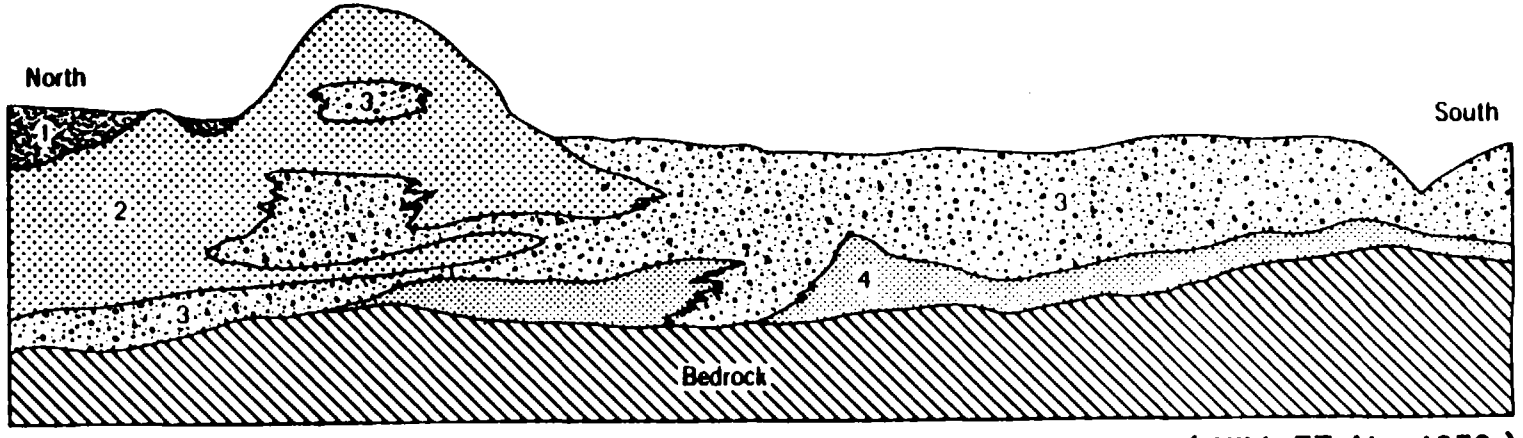
GENERALIZED STRATIGRAPHY OF LAPORTE COUNTY

FIGURE NO. 2.5-2



(HILL ET AL., 1979)

CDM *environmental engineers, scientists planners, & management consultants*	PHYSIOGRAPHIC MAP OF LAPORTE COUNTY	FIGURE NO. 2.5-3



(HILL ET AL., 1979)

LEGEND

UNIT 1 - LACUSTRINE CLAY AND SAND

UNIT 2 - LOAMY TO SILTY LOAM TILL (VALPARISO MORAINE)

UNIT 3 - SAND AND GRAVEL COMPLEX

UNIT 4 - HARD TILL

DIAGRAMMATIC CROSS - SECTION
THROUGH LAPORTE COUNTY

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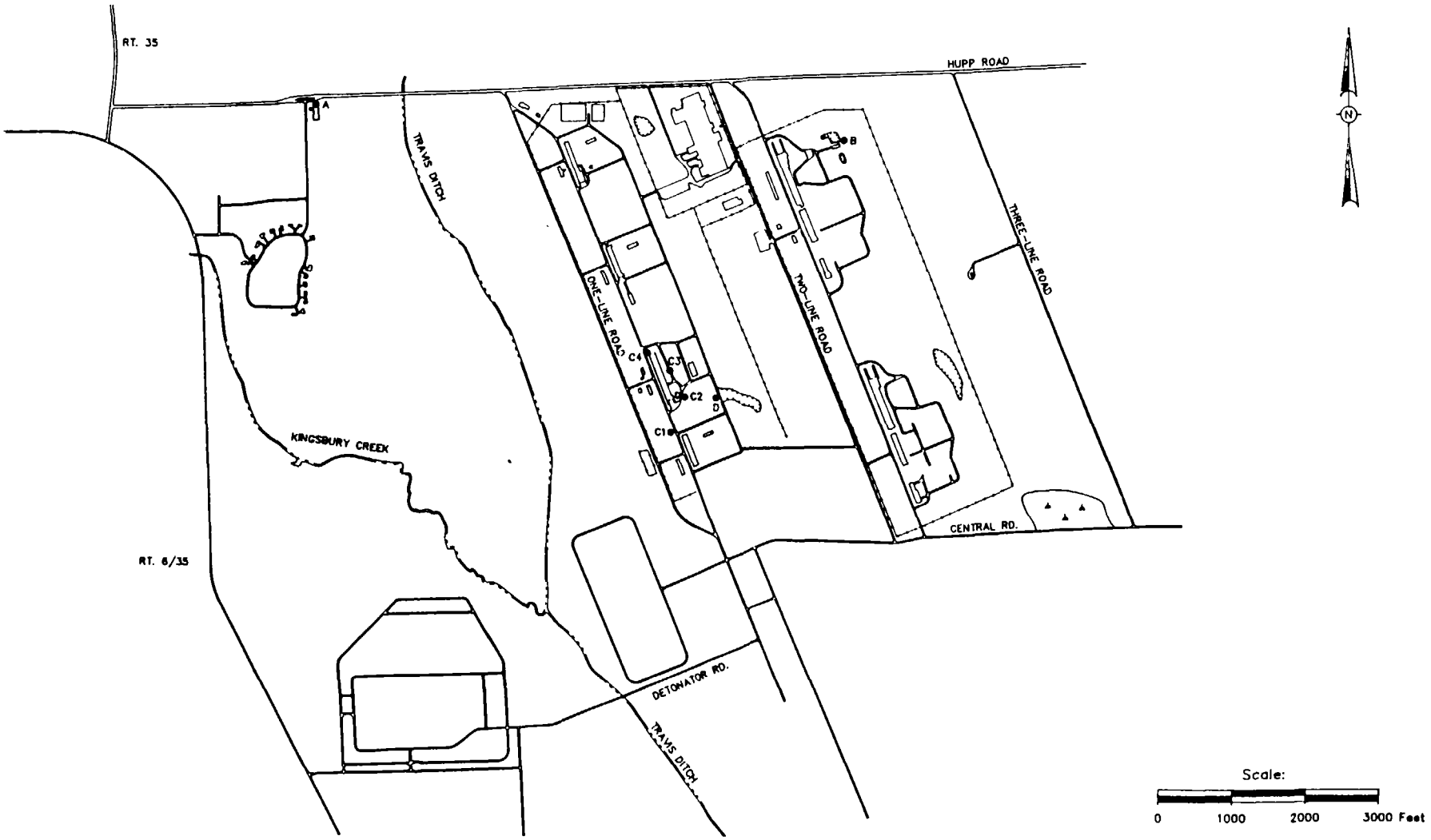
FIG. NO.
2.5-4



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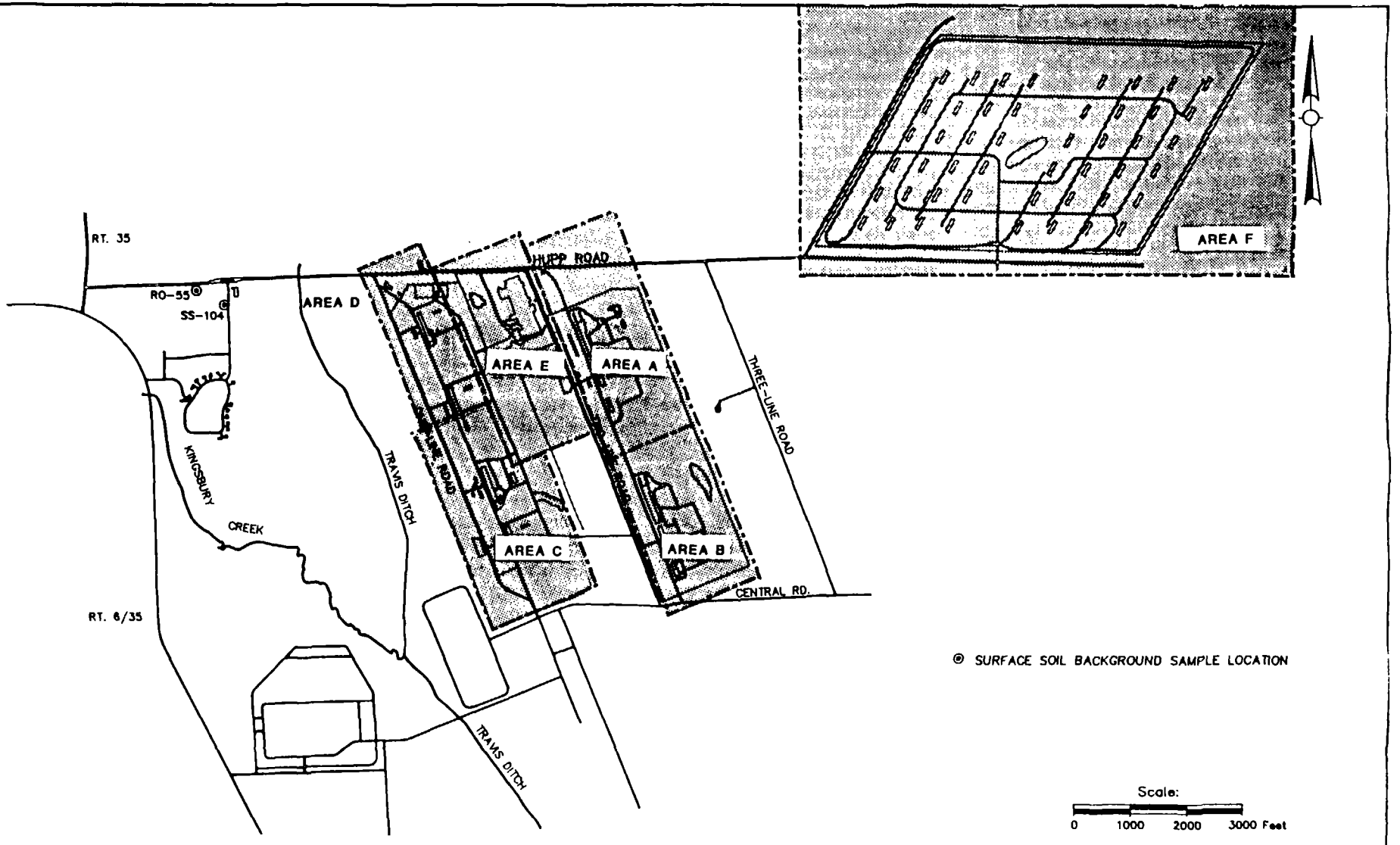
AMBIENT AIR MONITORING
SAMPLE LOCATIONS

FIGURE NO.
3.2–1



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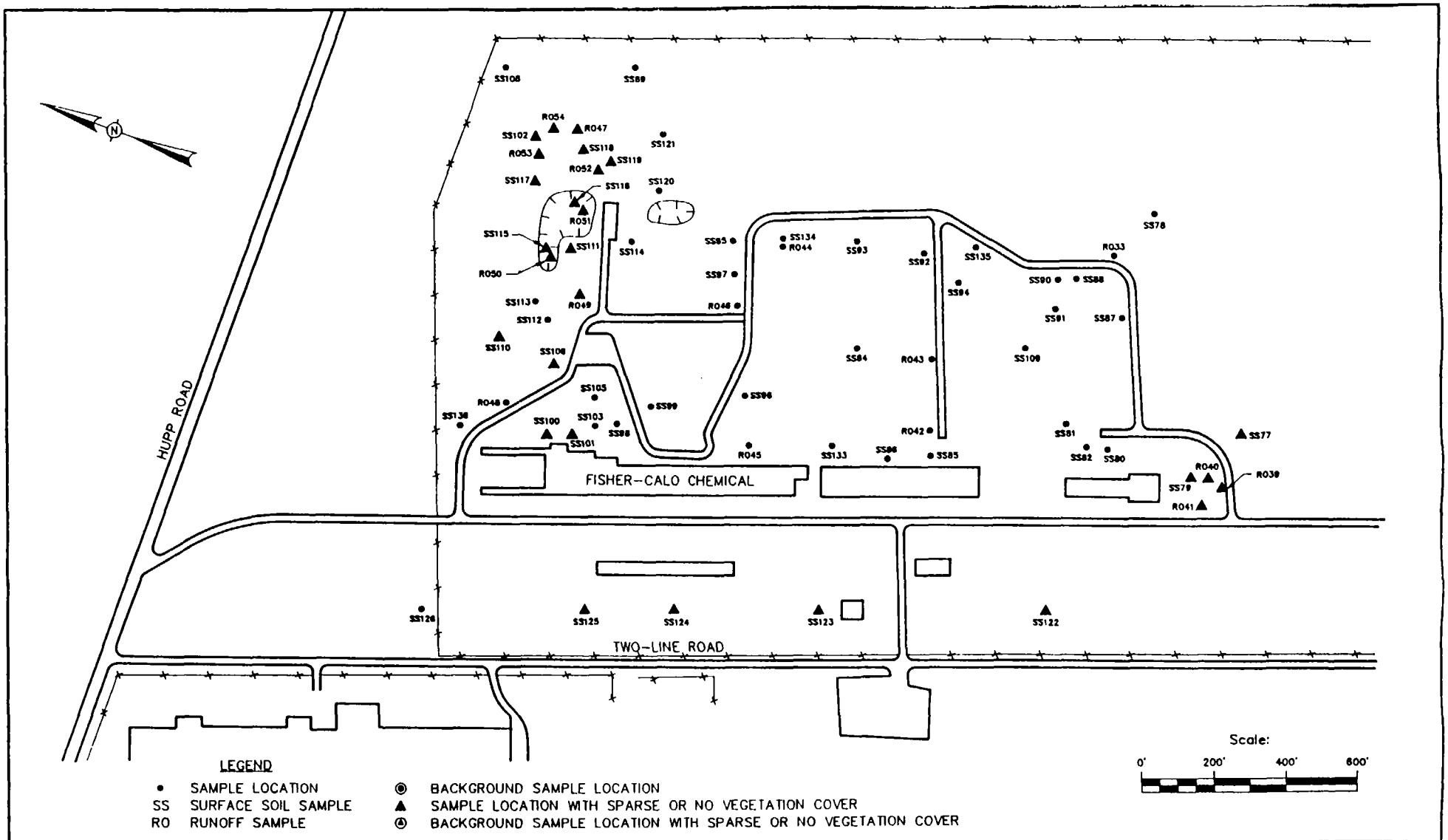
SITE AREA MAP

SURFACE SOIL SAMPLE AREA LOCATION

FIGURE NO.
3.3-1



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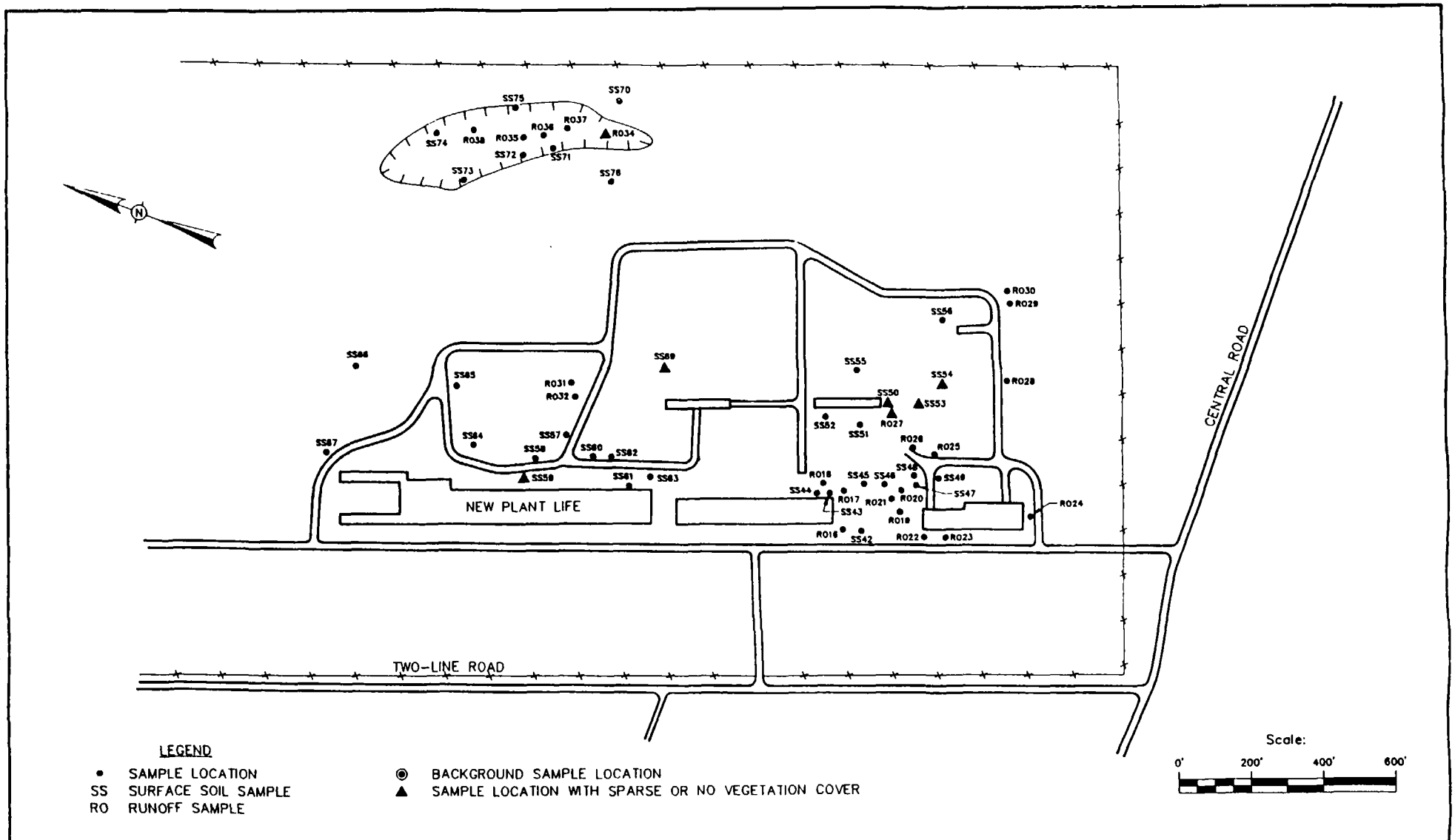
STUDY AREA A – FISHER–CALO PLANT

SURFACE SOIL AND RUNOFF SAMPLE LOCATION MAP

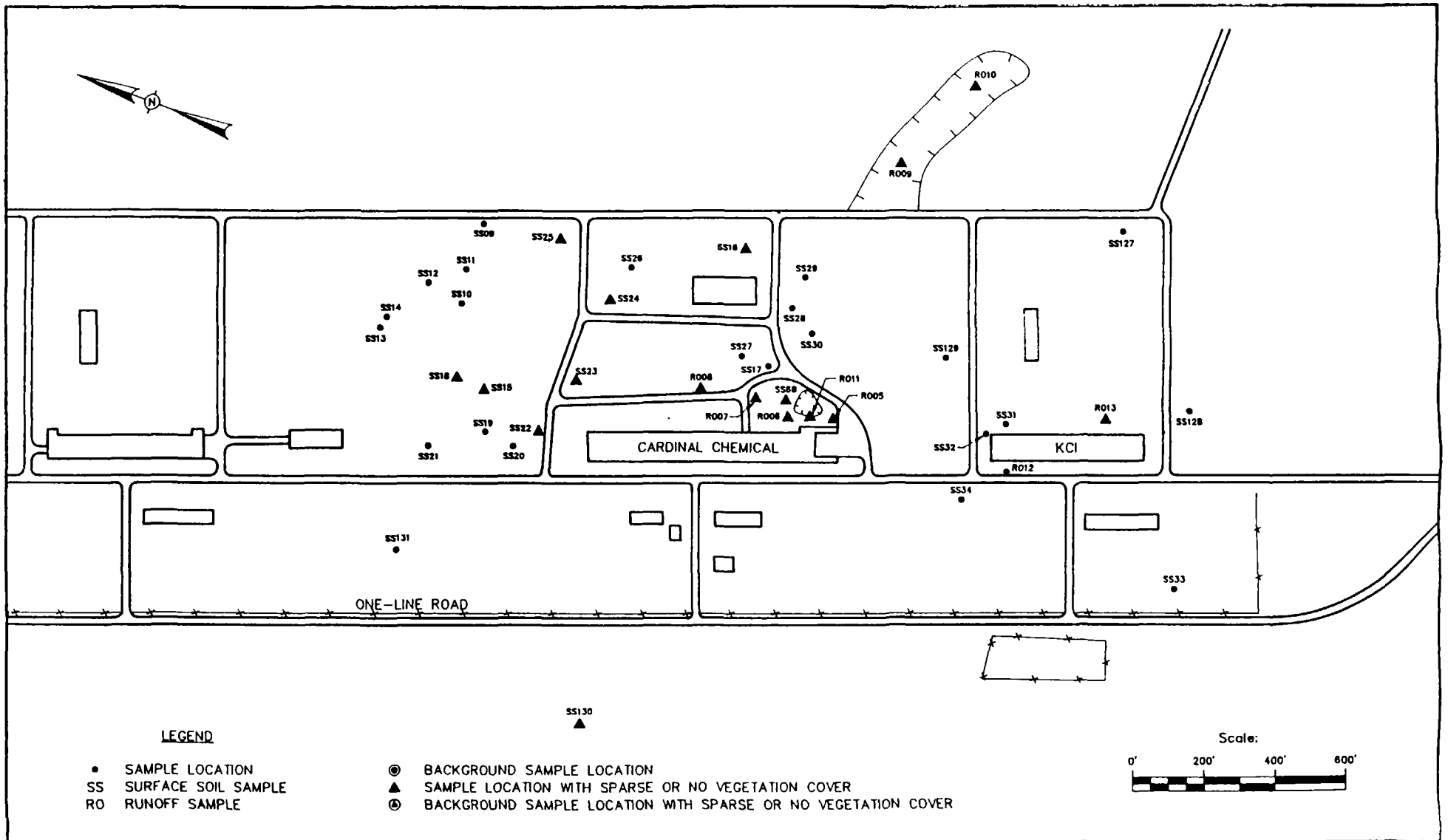
FIGURE NO. **3.3-2**



LEGEND

- • SAMPLE LOCATION
- SS SURFACE SOIL SAMPLE
- RO RUNOFF SAMPLE
- ◉ BACKGROUND SAMPLE LOCATION
- ▲ SAMPLE LOCATION WITH SPARSE OR NO VEGETATION COVER

CDM *environmental engineers, scientists, planners, & management consultants*	STUDY AREA B – NEW PLANT LIFE	SURFACE SOIL AND RUNOFF SAMPLE LOCATION MAP	FIGURE NO. **3.3-3**



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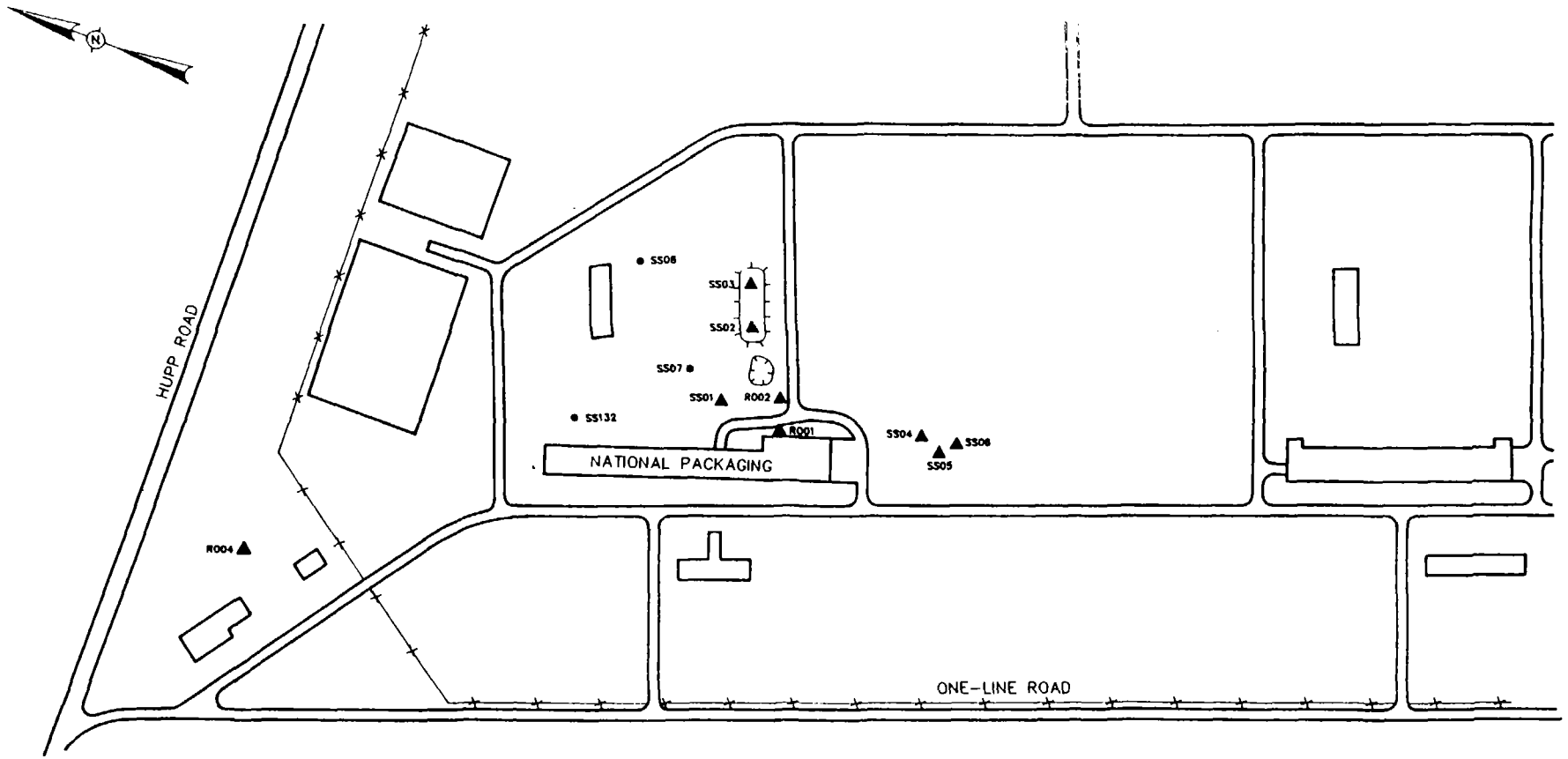
STUDY AREA C – CARDINAL CHEMICAL

SURFACE SOIL AND RUNOFF SAMPLE LOCATION MAP

FIGURE NO. **3.3-4**



LEGEND

- • SAMPLE LOCATION
- SS SURFACE SOIL SAMPLE
- RO RUNOFF SAMPLE
- ◉ BACKGROUND SAMPLE LOCATION
- ▲ SAMPLE LOCATION WITH SPARSE OR NO VEGETATION COVER

Scale: 0' 200' 400' 600'

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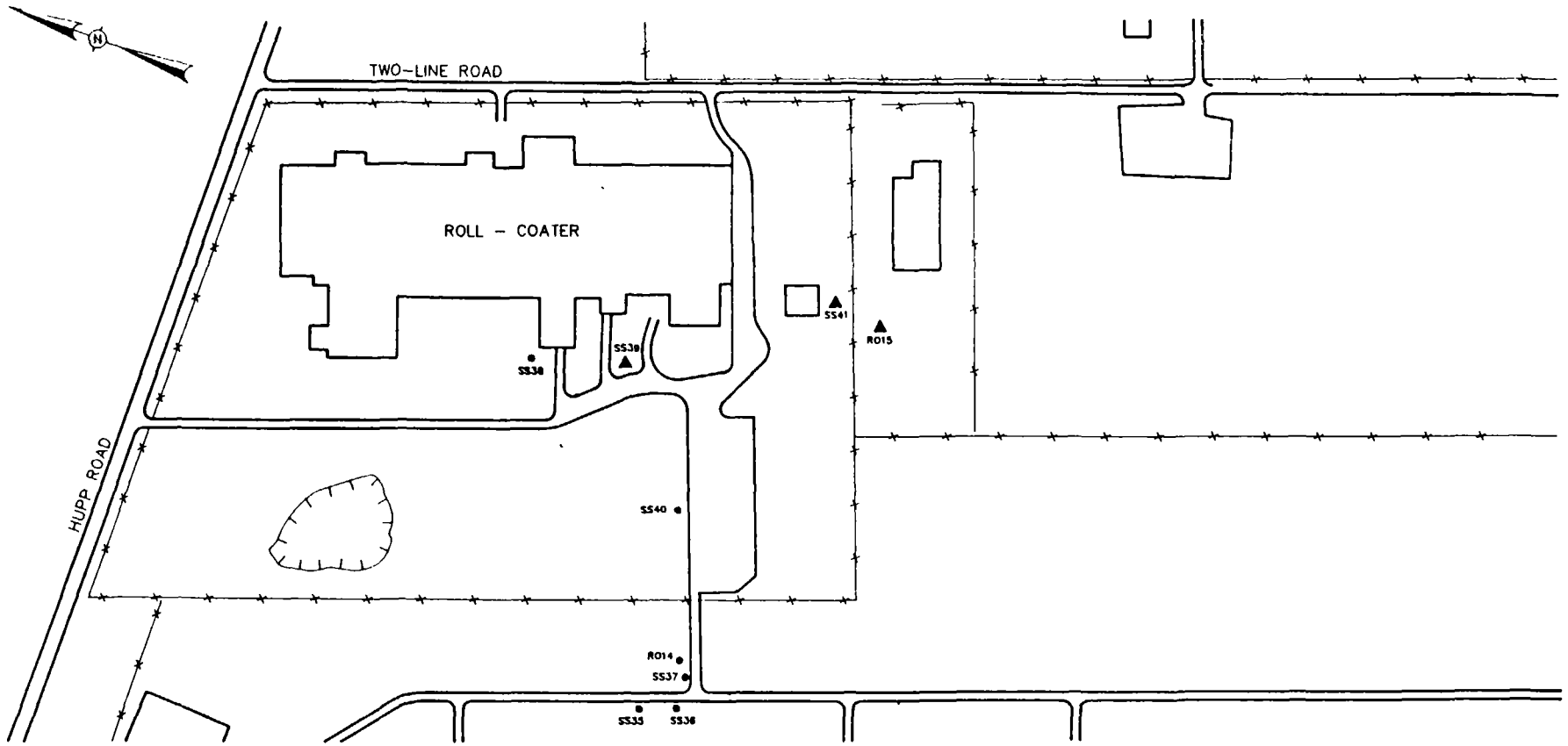
STUDY AREA D – NATIONAL PACKAGING

SURFACE SOIL AND RUNOFF SAMPLE LOCATION MAP

FIGURE NO. **3.3-5**



LEGEND

- • SAMPLE LOCATION
- SS SURFACE SOIL SAMPLE
- RO RUNOFF SAMPLE
- ◉ BACKGROUND SAMPLE LOCATION
- ▲ SAMPLE LOCATION WITH SPARSE OR NO VEGETATION COVER

Scale: 0' 200' 400' 600'

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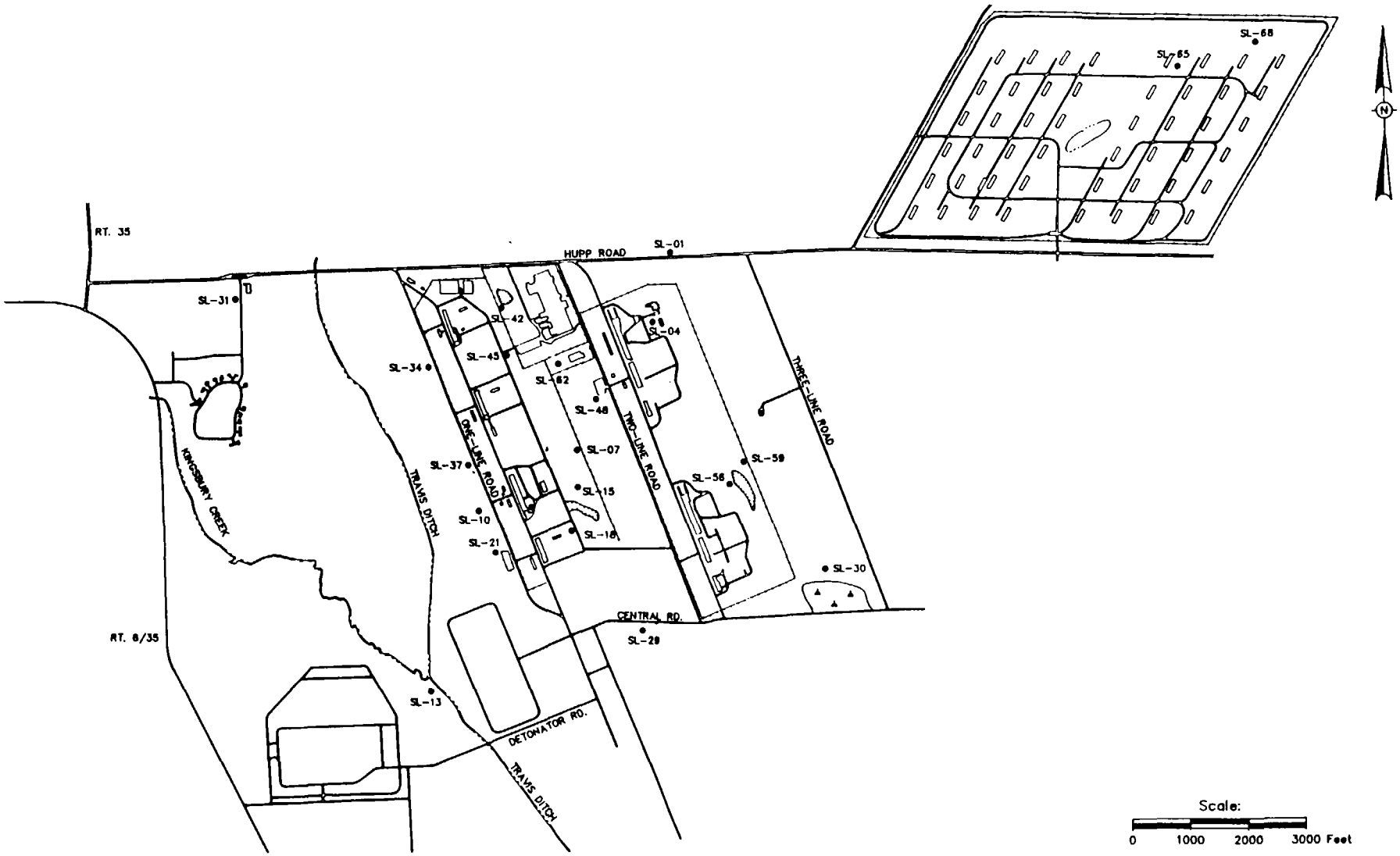
STUDY AREA E – ROLL-COATER

SURFACE SOIL AND RUNOFF SAMPLE LOCATION MAP

FIGURE NO. **3.3-6**



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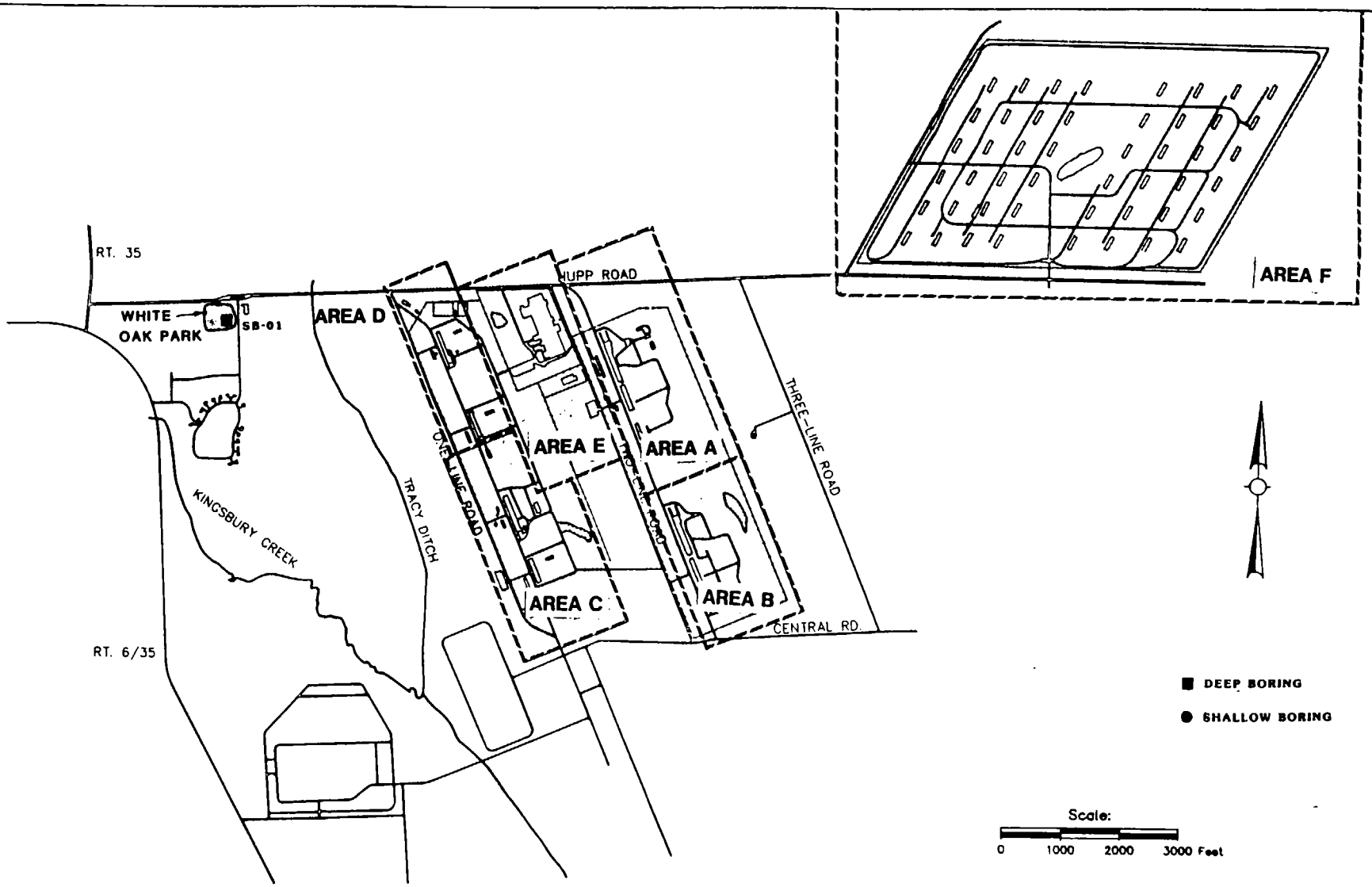
DEEP WELL SOIL BORING
SAMPLE LOCATION MAP

FIGURE NO.

3.3-7



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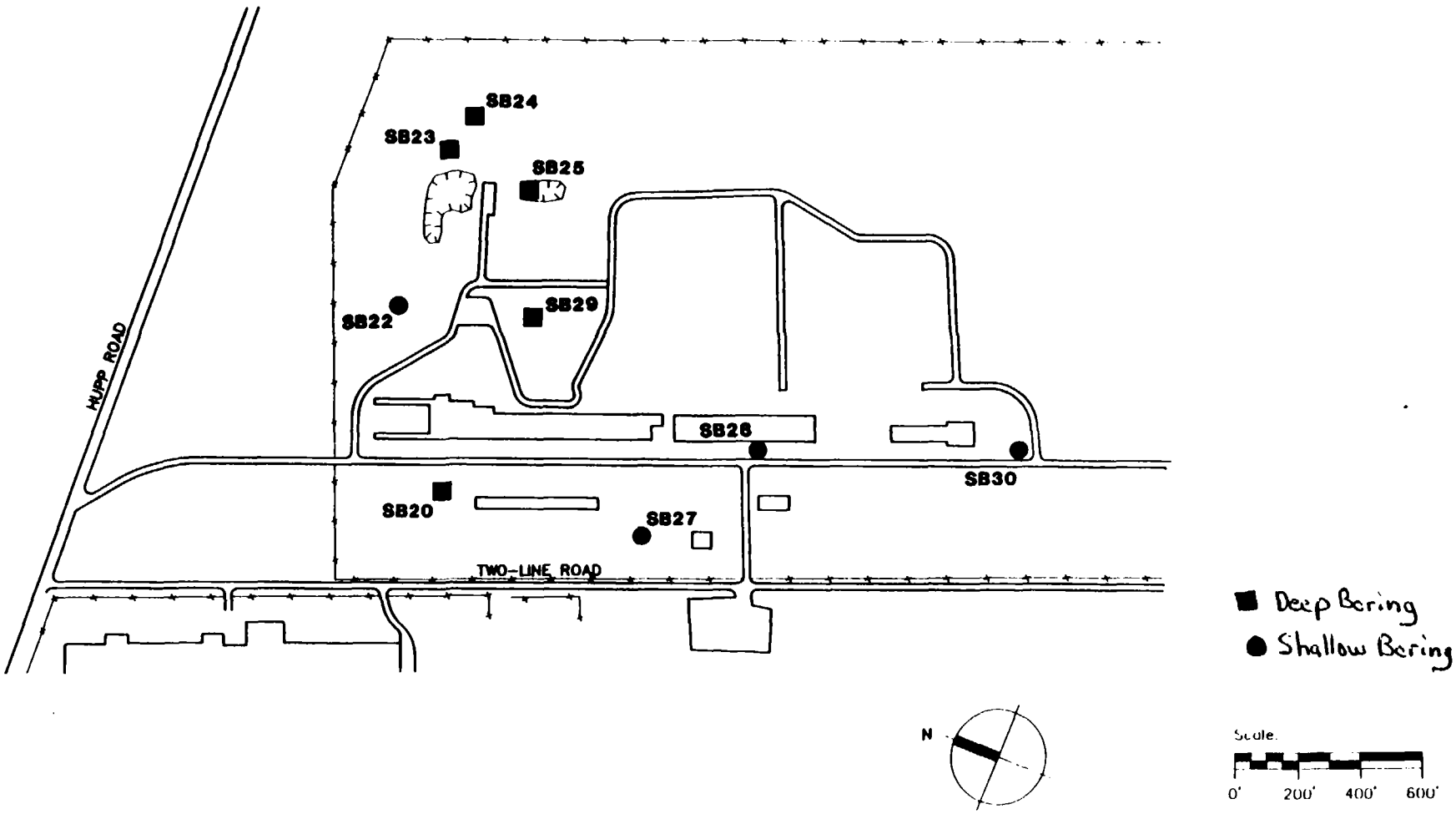
SAMPLING AREA MAP

FIGURE NO.

3.3-8



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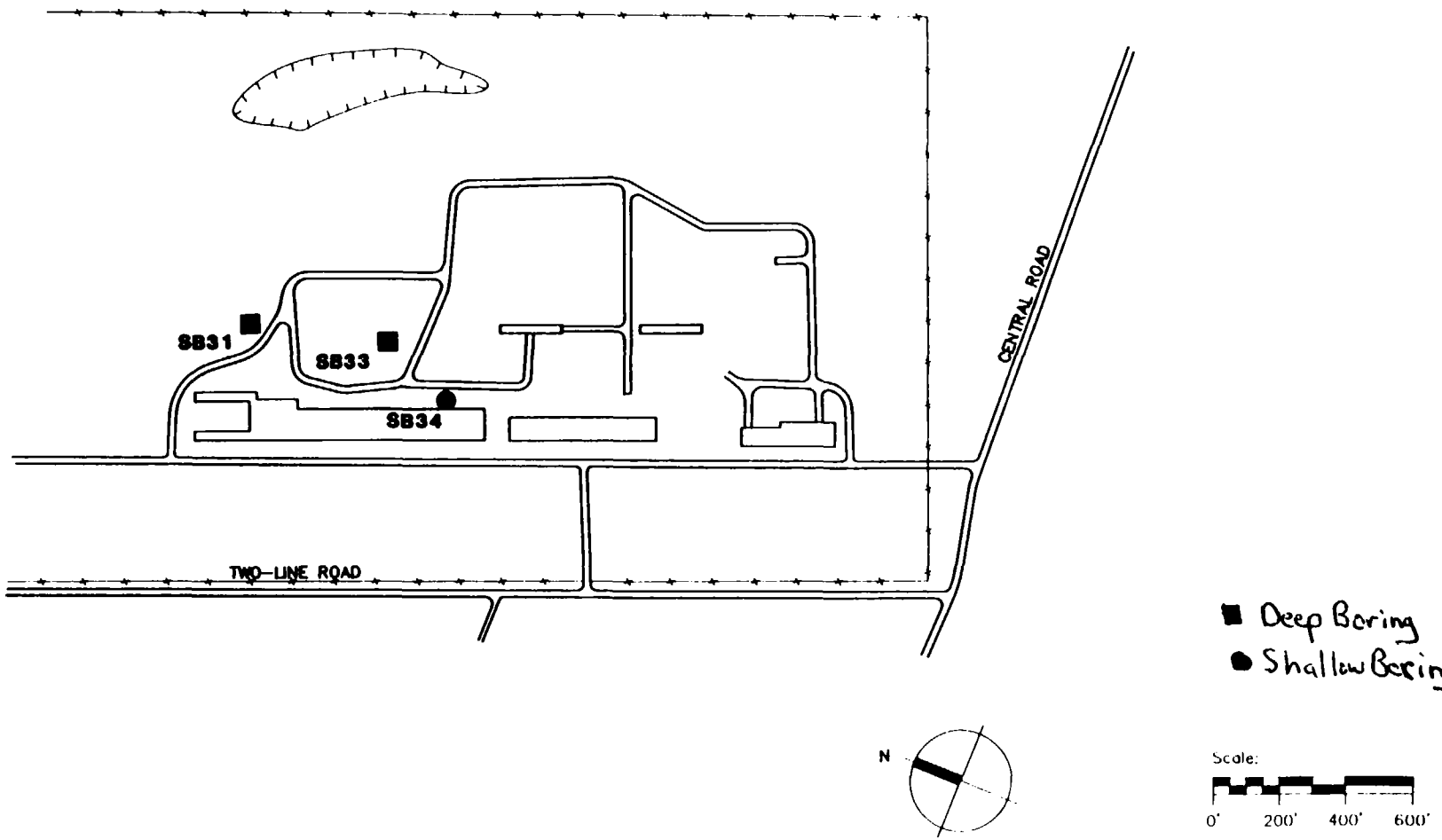
STUDY AREA A –
FISHER–CALO PLANT

FIGURE NO
3.3-9



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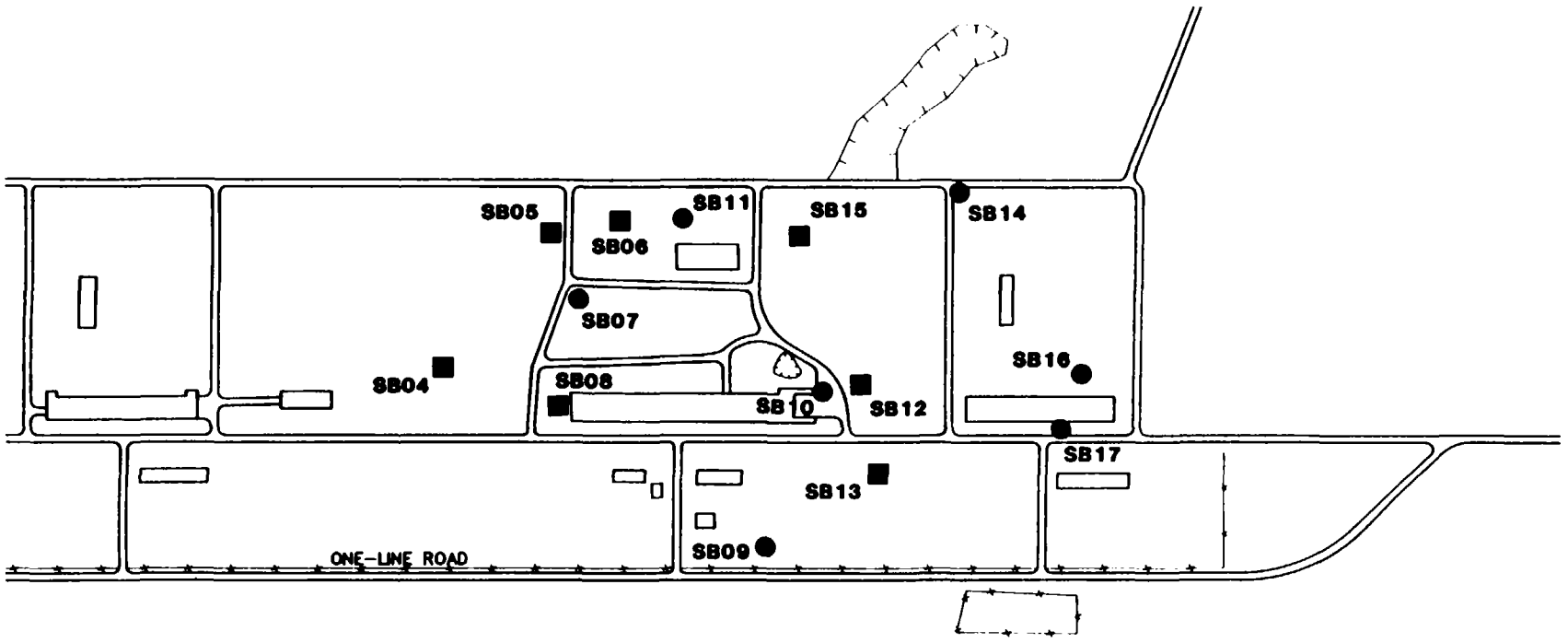
STUDY AREA B –
NEW PLANT LIFE

FIGURE NO.
3.3-10



■ Deep Boring
● Shallow Boring

N

Scale.
0' 200' 400' 600'

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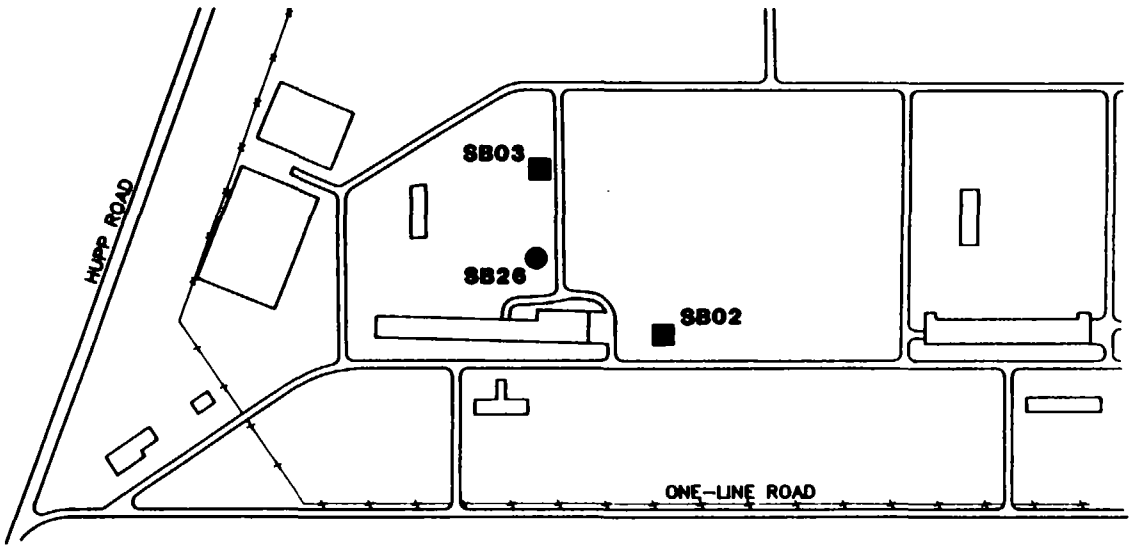
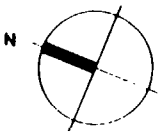
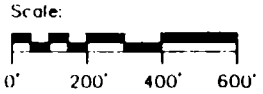
STUDY AREA C –
CARDINAL CHEMICAL

FIGURE NO.
3.3-11



■ Deep Boring
● Shallow Boring





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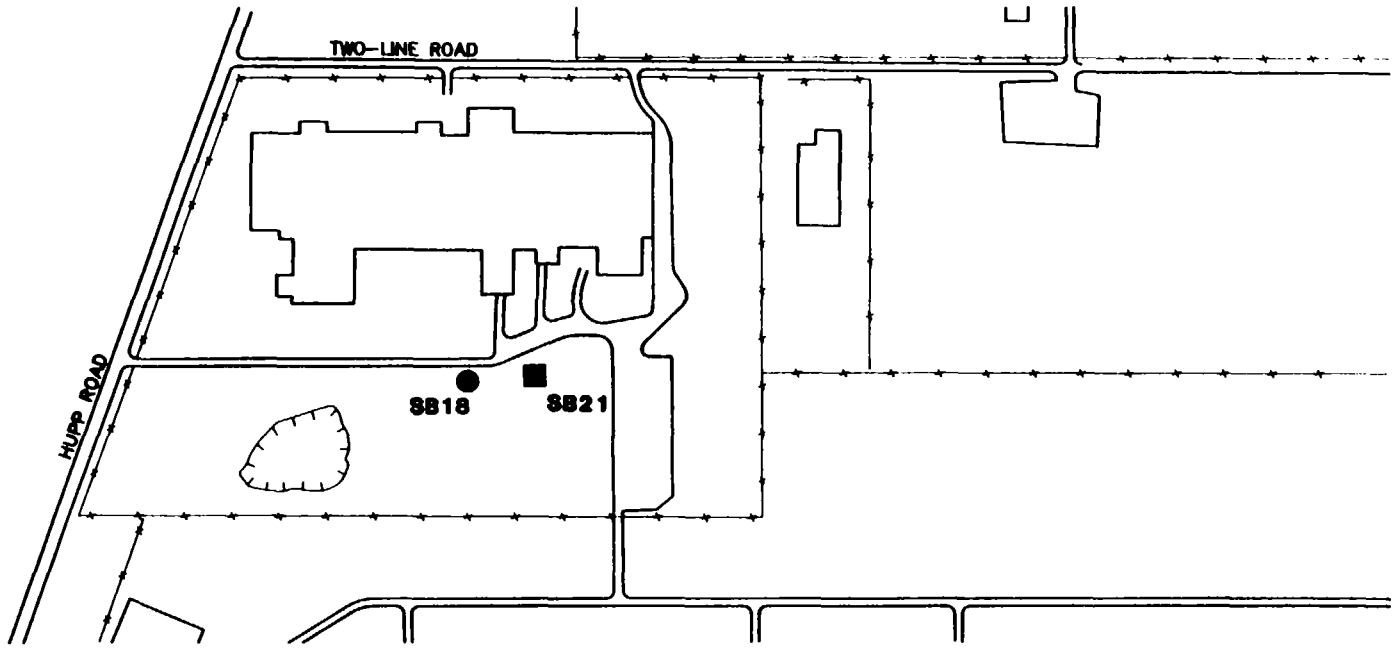
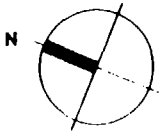
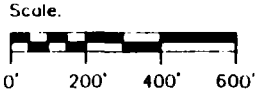
STUDY AREA D –
NATIONAL PACKAGING

FIGURE NO.
3.3-12



■ Deep Boring
● Shallow Boring





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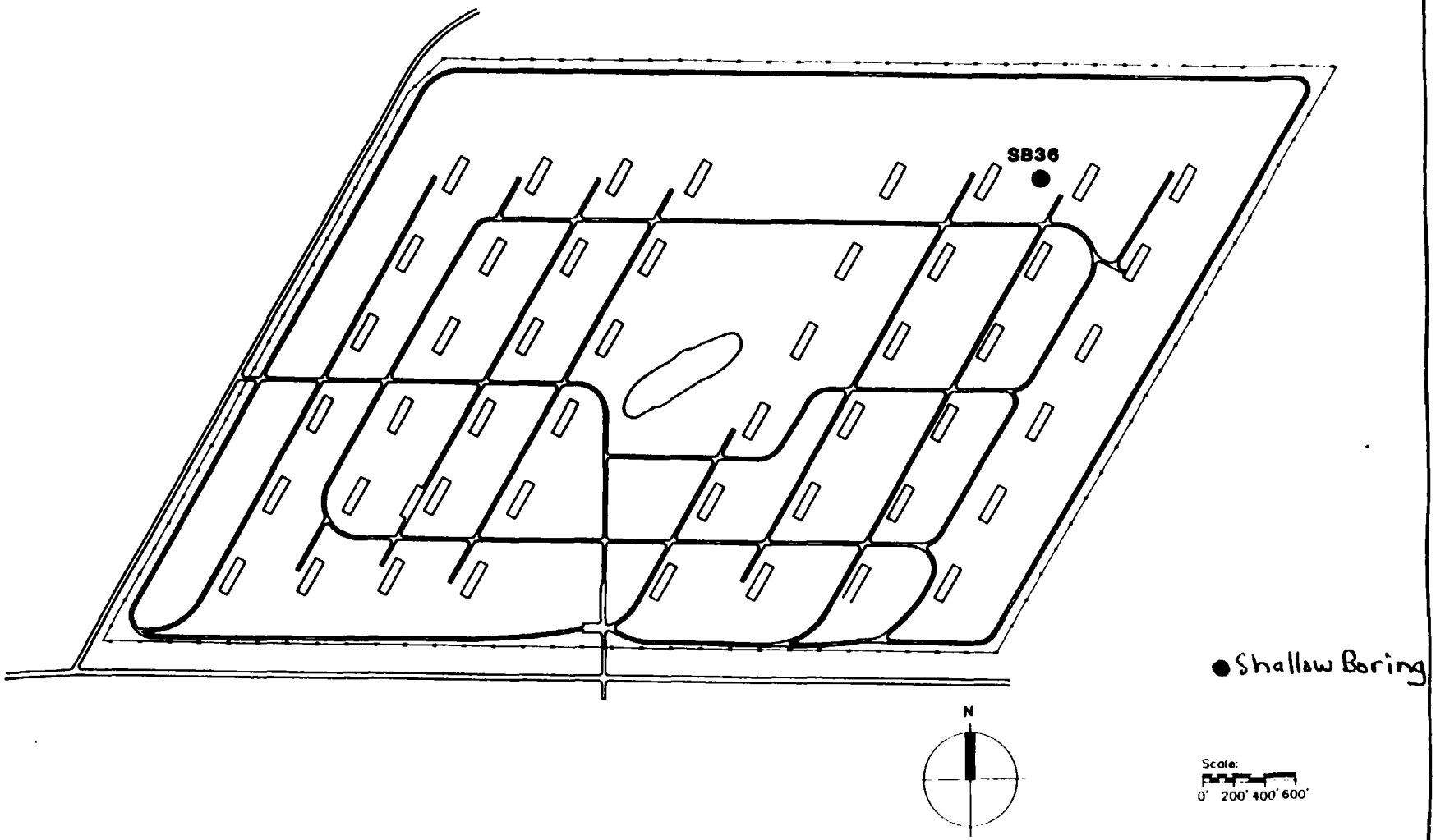
STUDY AREA E –
ROLL–COATER

FIGURE NO
3.3-13



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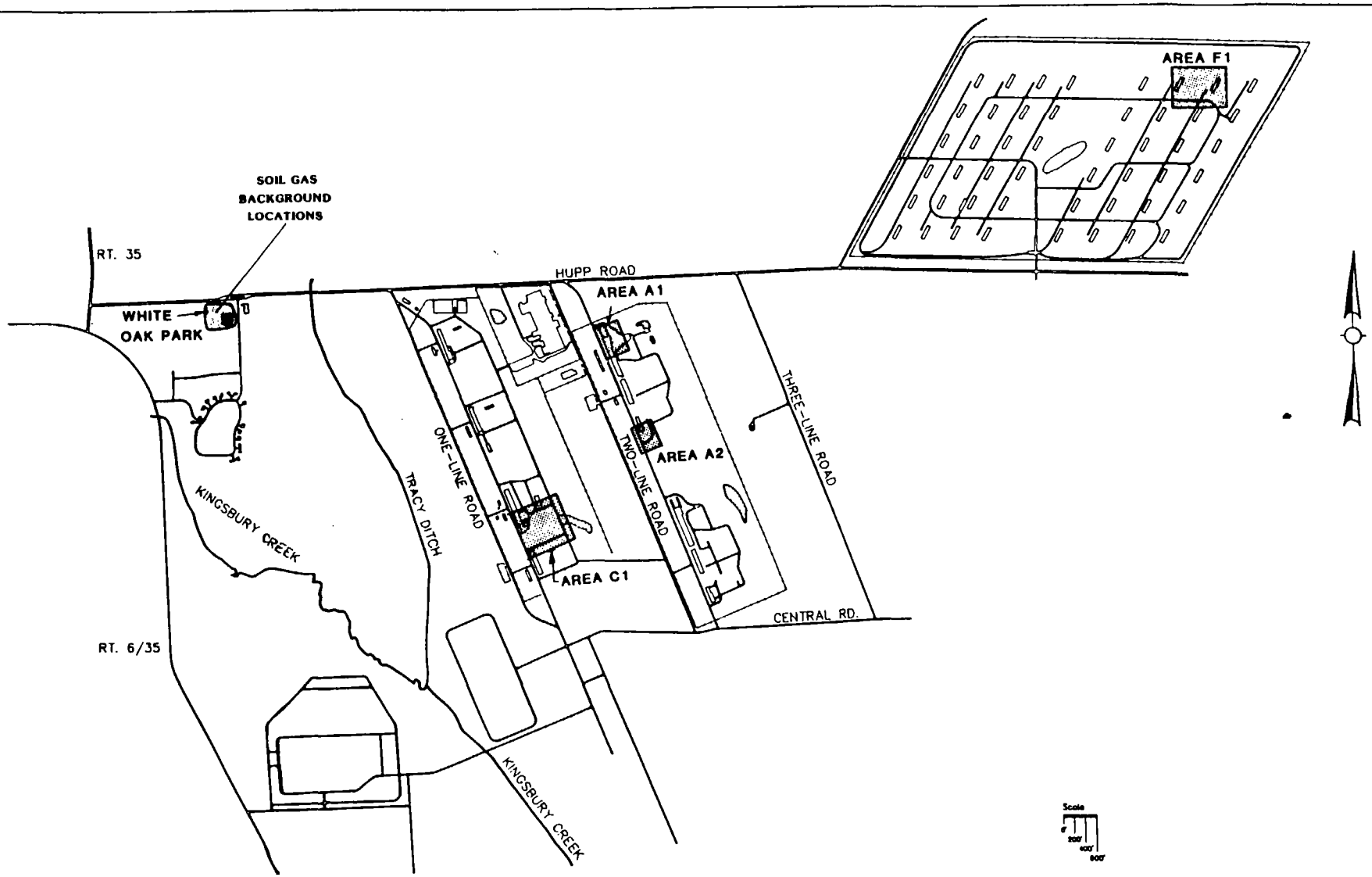
STUDY AREA F –
SPACE LEASING

FIGURE NO.
3.3-14



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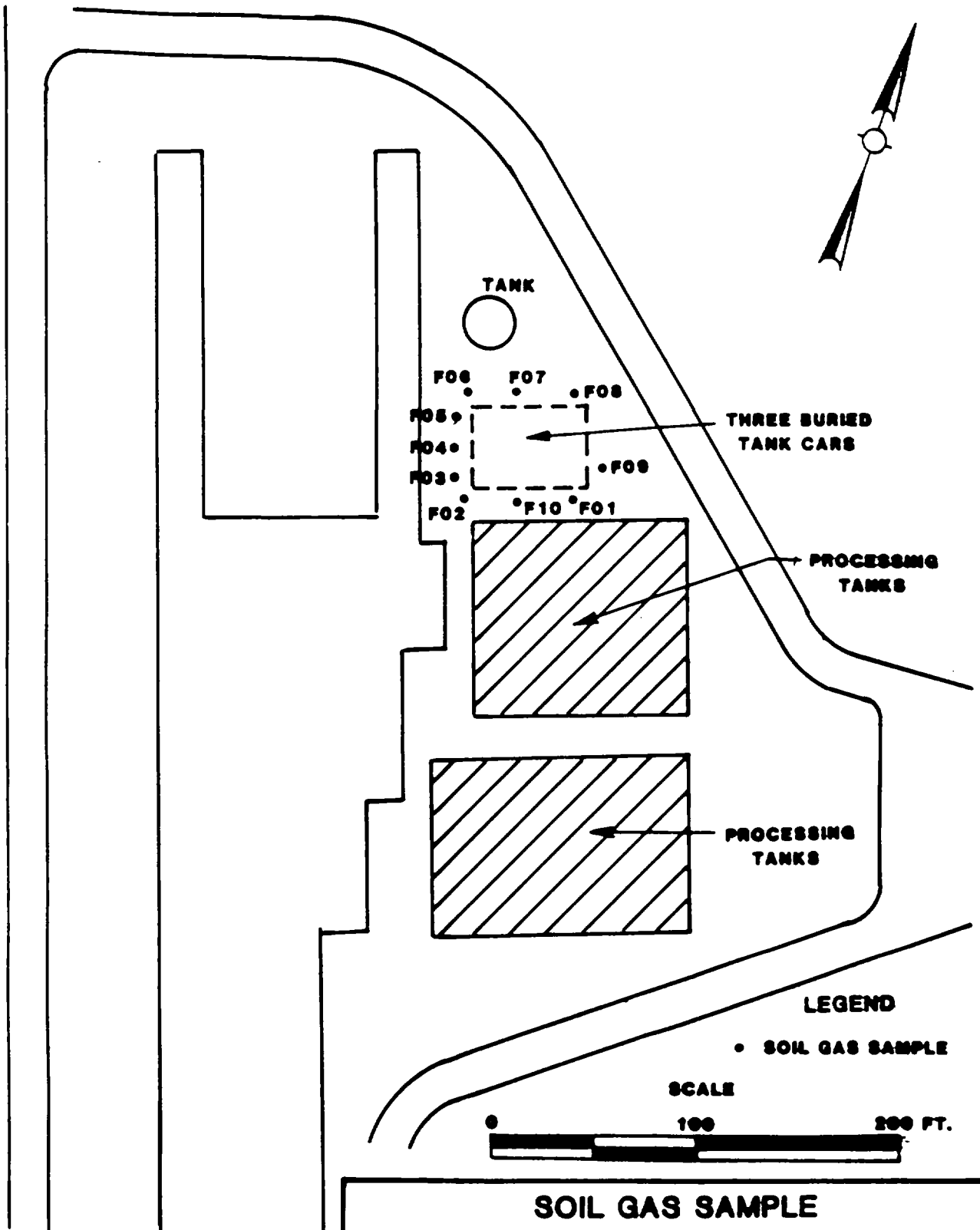
SOIL GAS SURVEY LOCATION MAP

FIGURE NO.

3.3-15



SOIL GAS SAMPLE
LOCATION MAP-AREA A1

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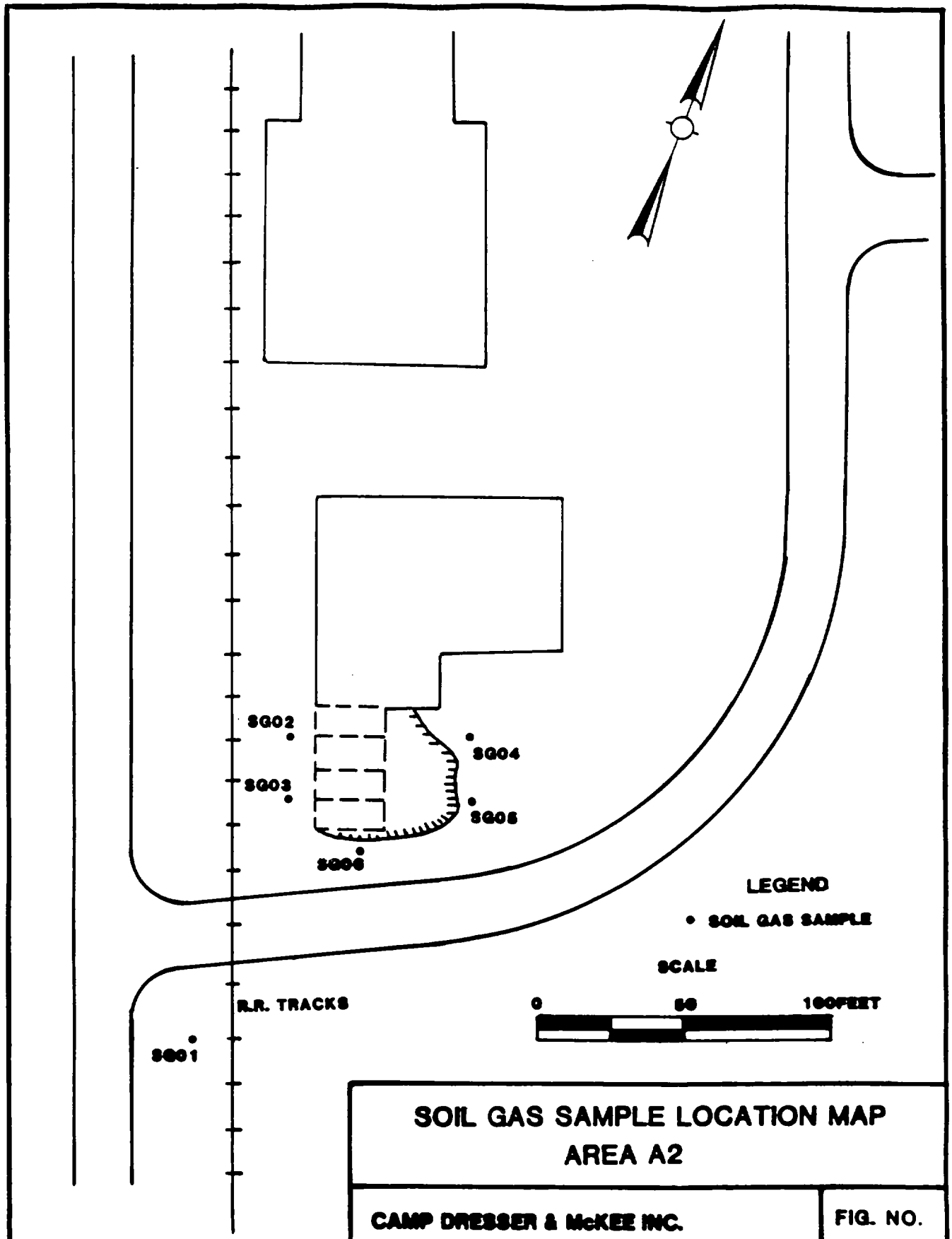
FIG. NO.
3.3-16

503200



SOIL GAS SAMPLE LOCATION MAP
AREA A2

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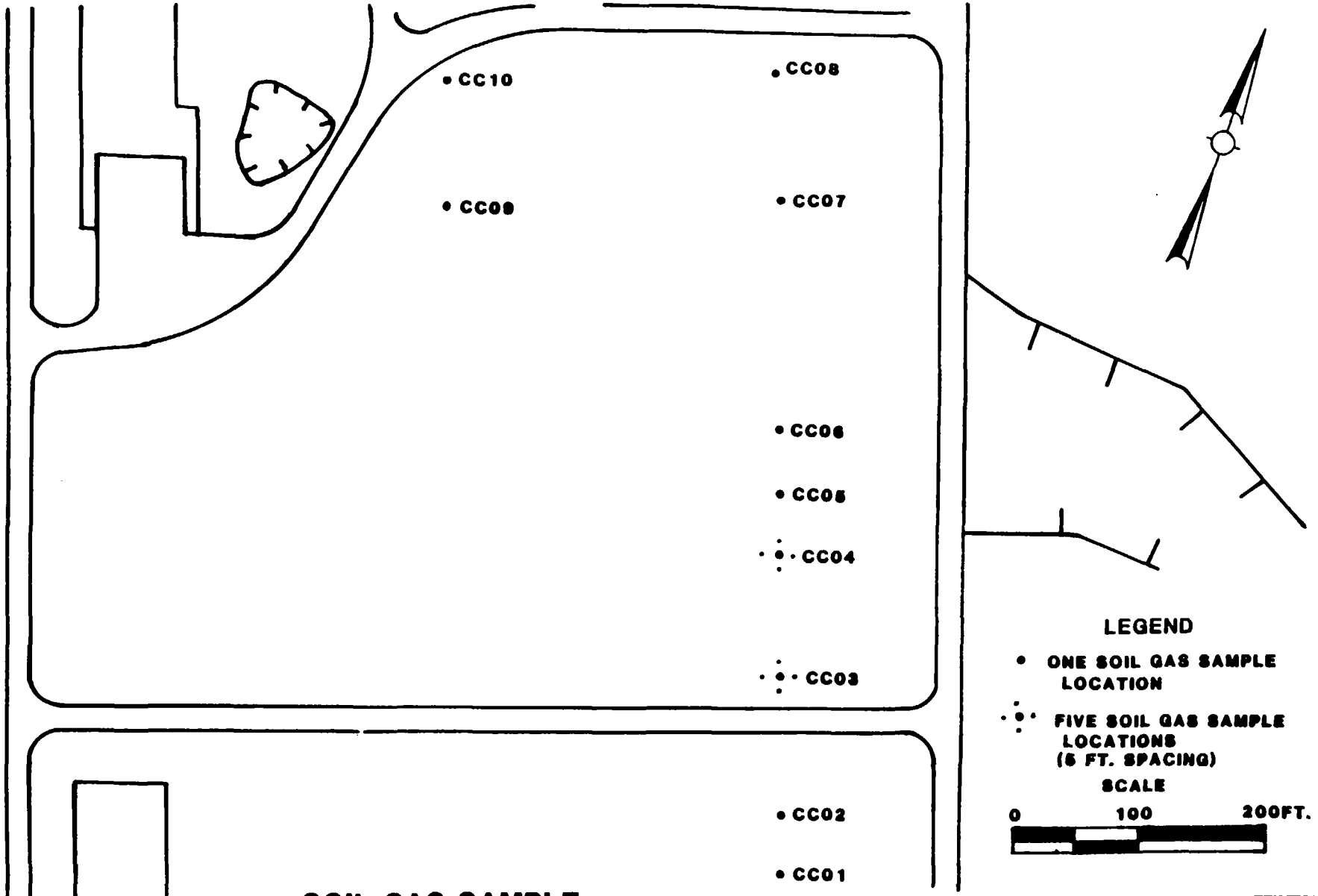
FIG. NO.
3.3-17



SOIL GAS SAMPLE LOCATION MAP-AREA C1

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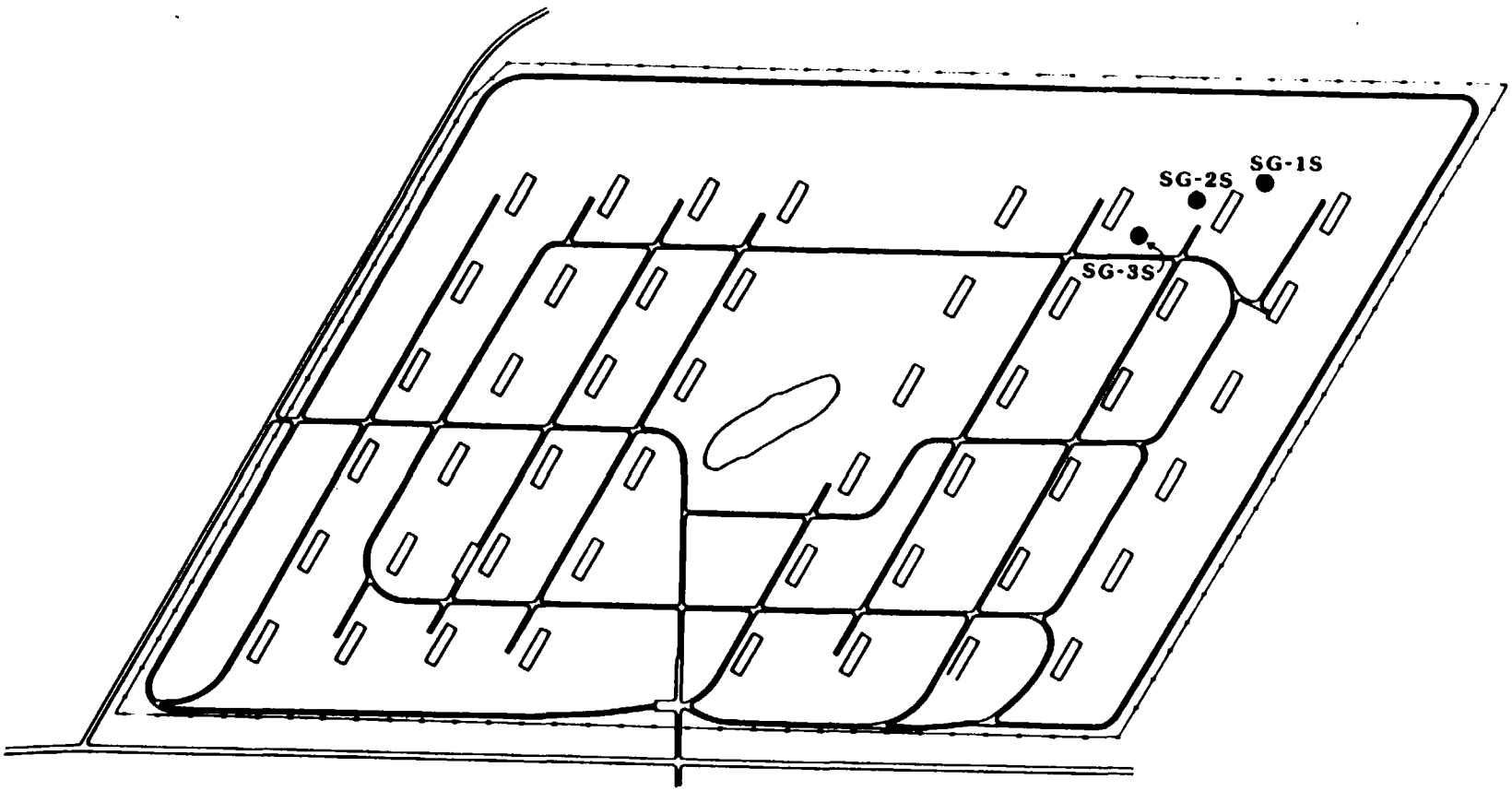
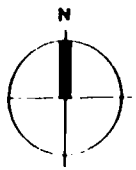
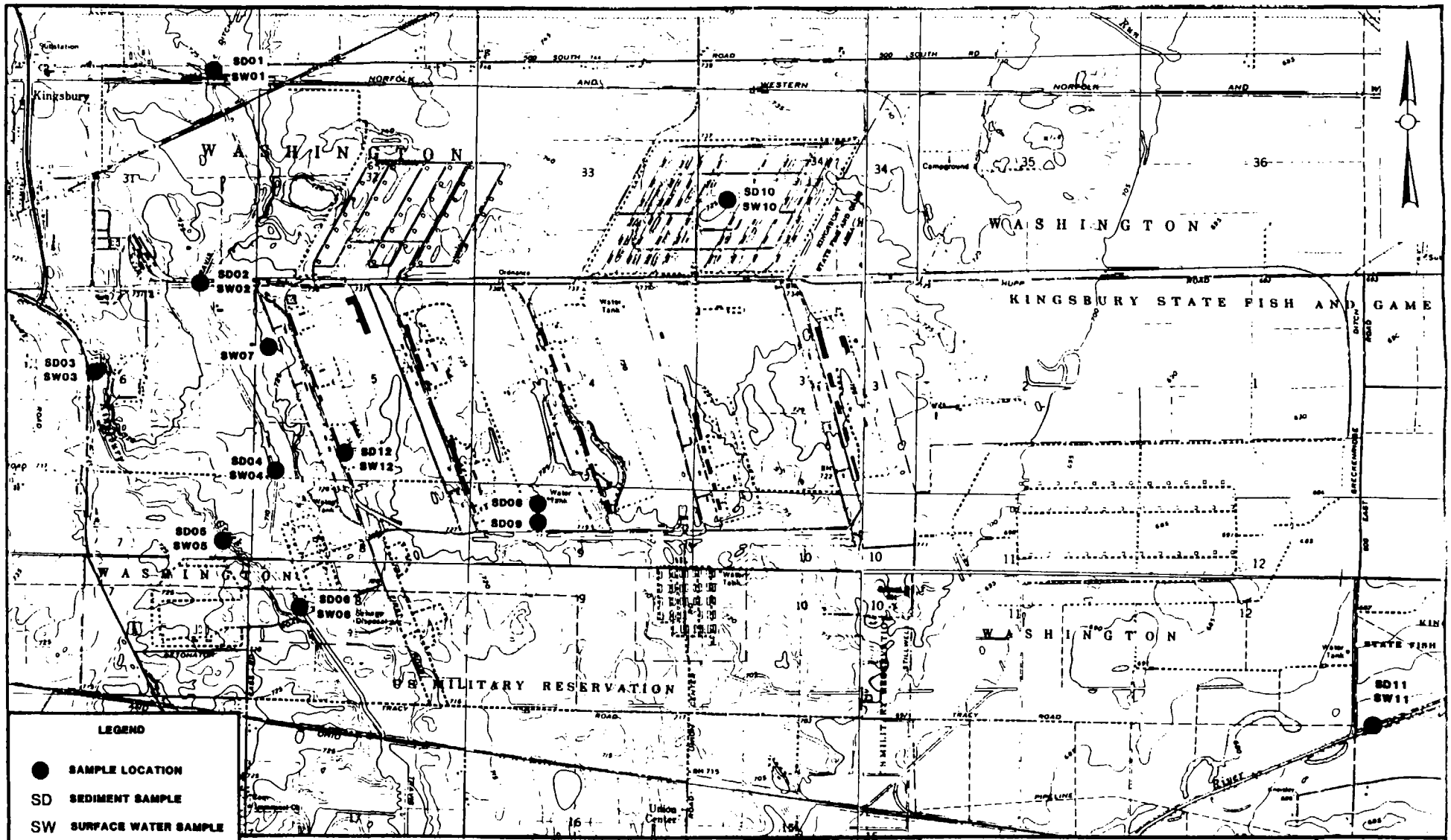
FIG. NO.
3.3-18



● SAMPLE LOCATION



CDM environmental engineers, scientists planners, & management consultants	STUDY AREA F – SPACE LEASING	**SOIL GAS SAMPLE LOCATIONS**	FIGURE NO **3.3-19**



SURFACE WATER / SEDIMENT
SAMPLE LOCATION MAP

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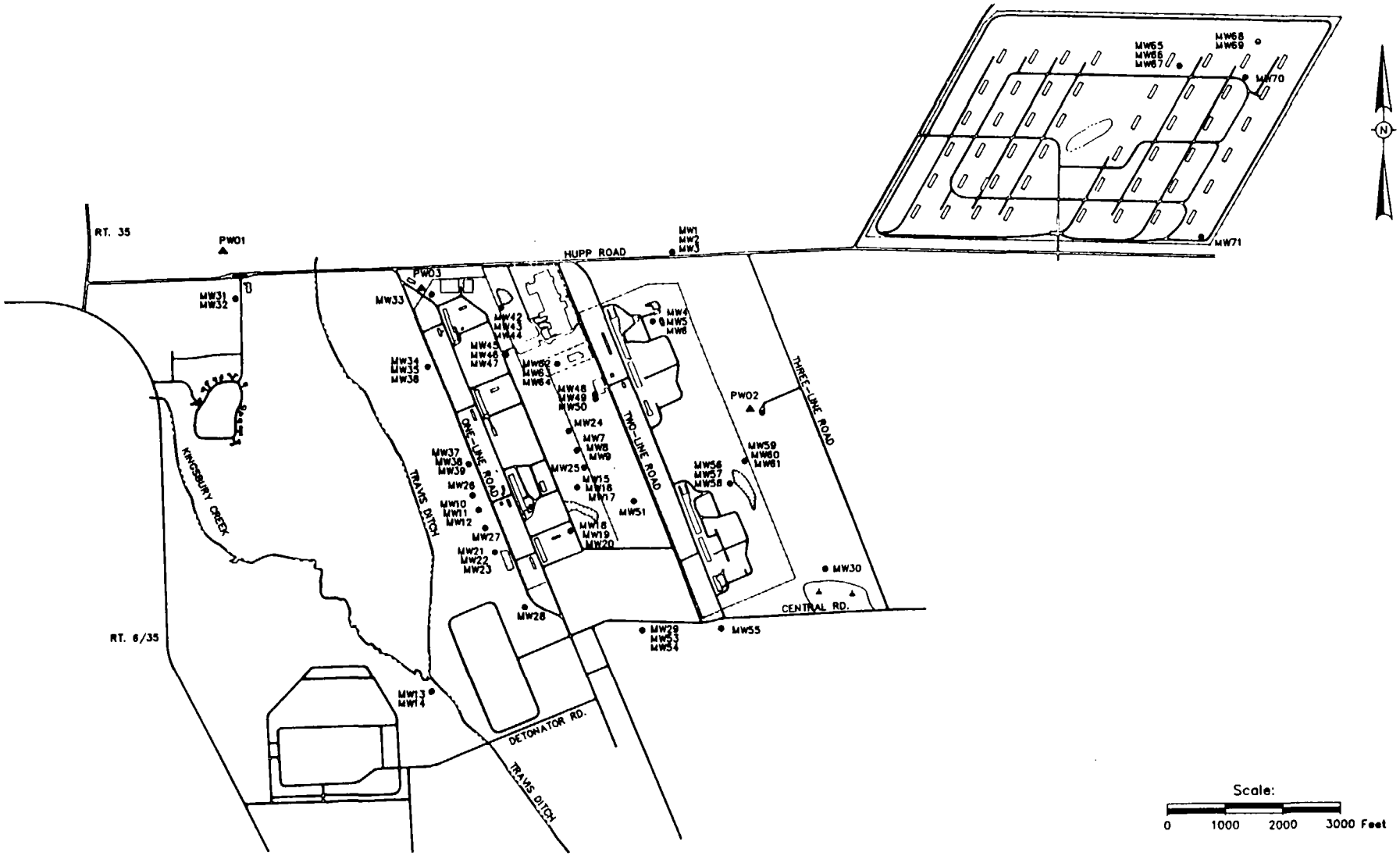
FIG. NO.
3.4-1



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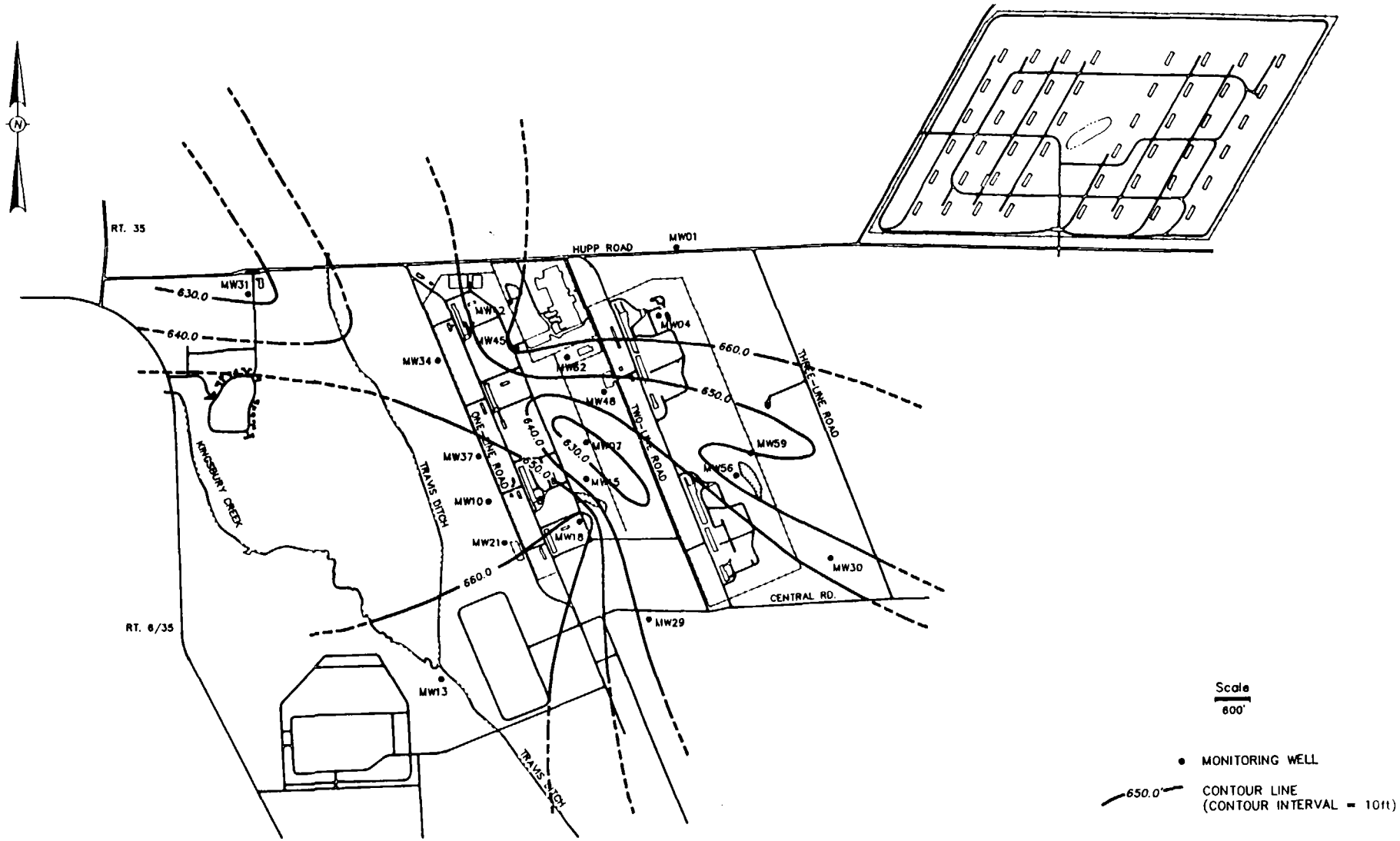
MONITORING WELL LOCATION MAP

FIGURE NO.

3.5-1



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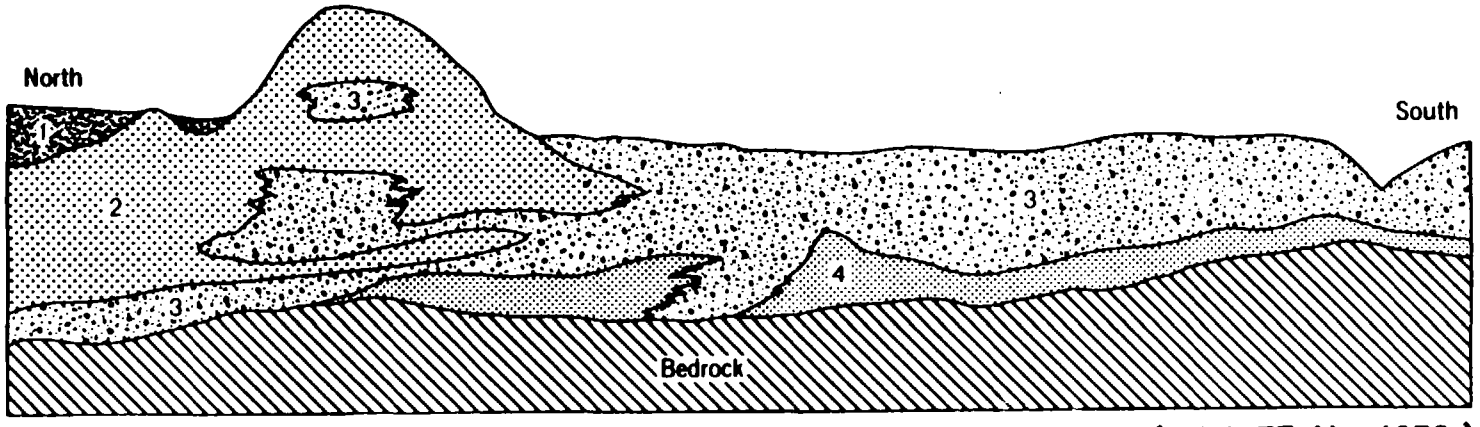
STRUCTURE CONTOUR OF THE TOP OF THE SILTY CLAY LAYER

FIGURE NO

3.5-2



(HILL ET AL., 1979)

LEGEND

UNIT 1 - LACUSTRINE CLAY AND SAND

UNIT 2 - LOAMY TO SILTY LOAM TILL (VALPARISO MORAINE)

UNIT 3 - SAND AND GRAVEL COMPLEX

UNIT 4 - HARD TILL

DIAGRAMMATIC CROSS - SECTION
THROUGH LAPORTE COUNTY

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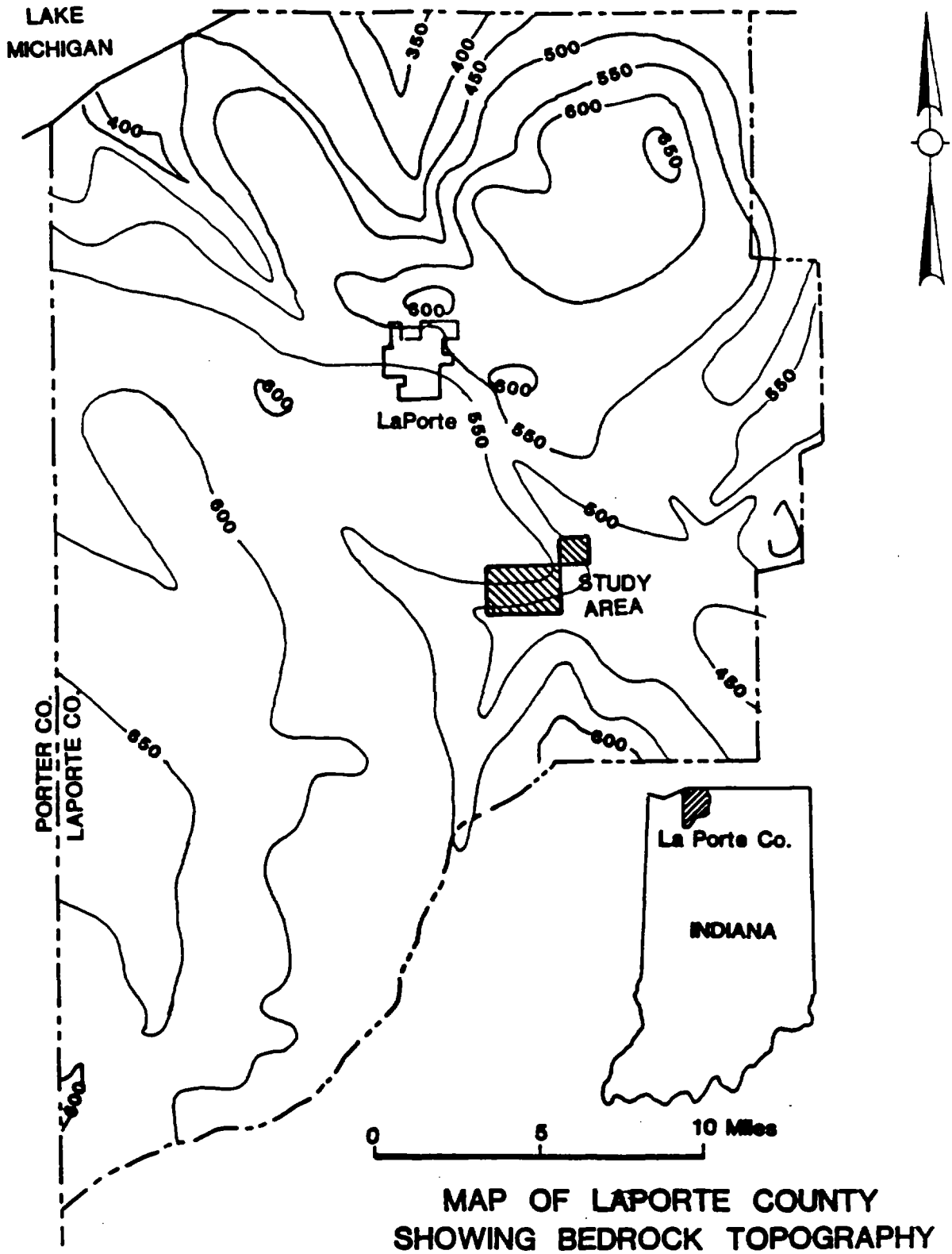
FIG. NO.
3.5-3



MAP OF LAPORTE COUNTY
SHOWING BEDROCK TOPOGRAPHY

(HILL ET AL., 1979)

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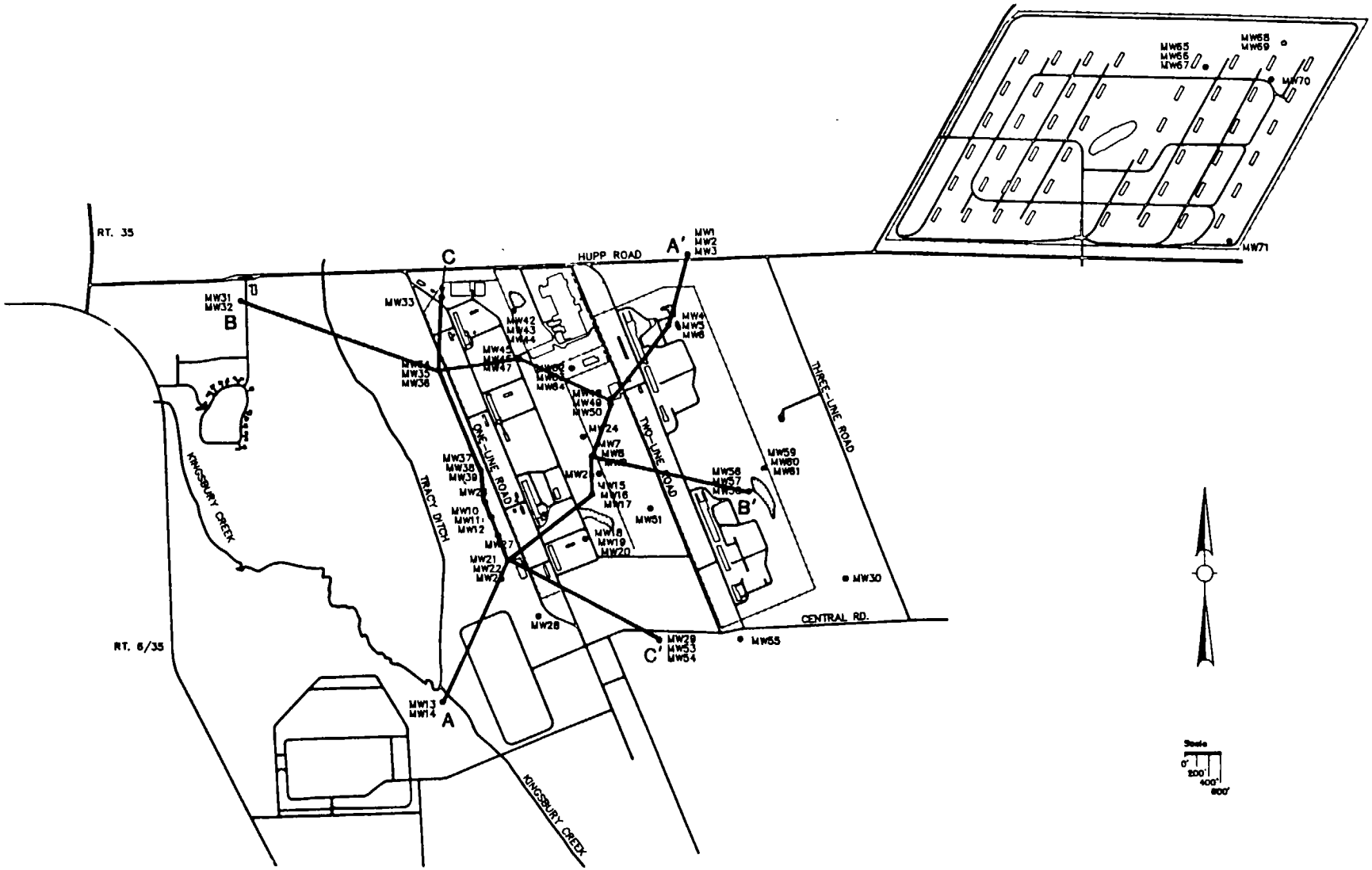
FIG. NO.

3.5-4



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GEOLOGIC CROSS - SECTION LOCATIONS

FIGURE NO.

3.5-5

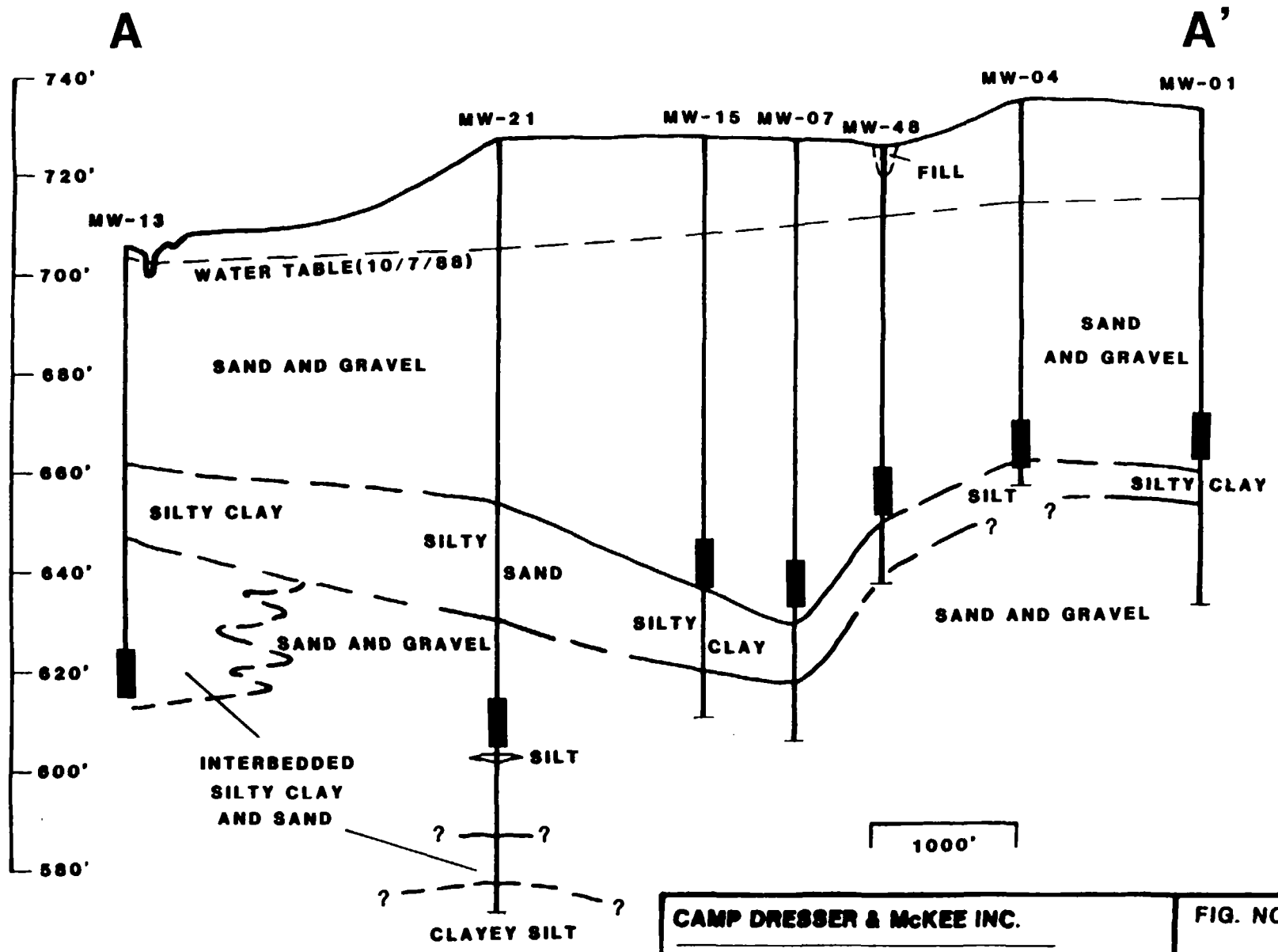

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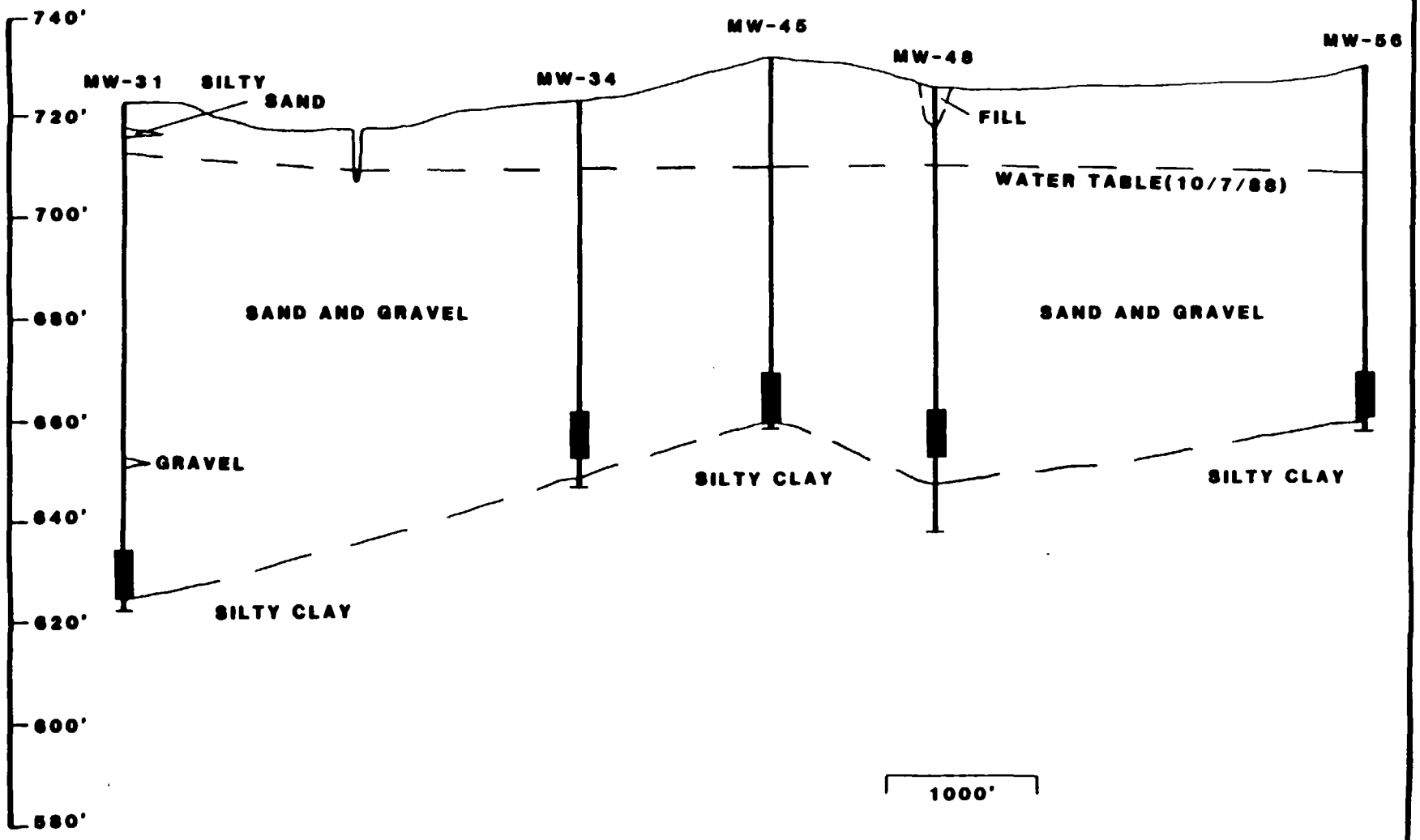
FIG. NO.
3.5-6

504176



SCREEN INTERVAL

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FIG. NO.
3.5-7

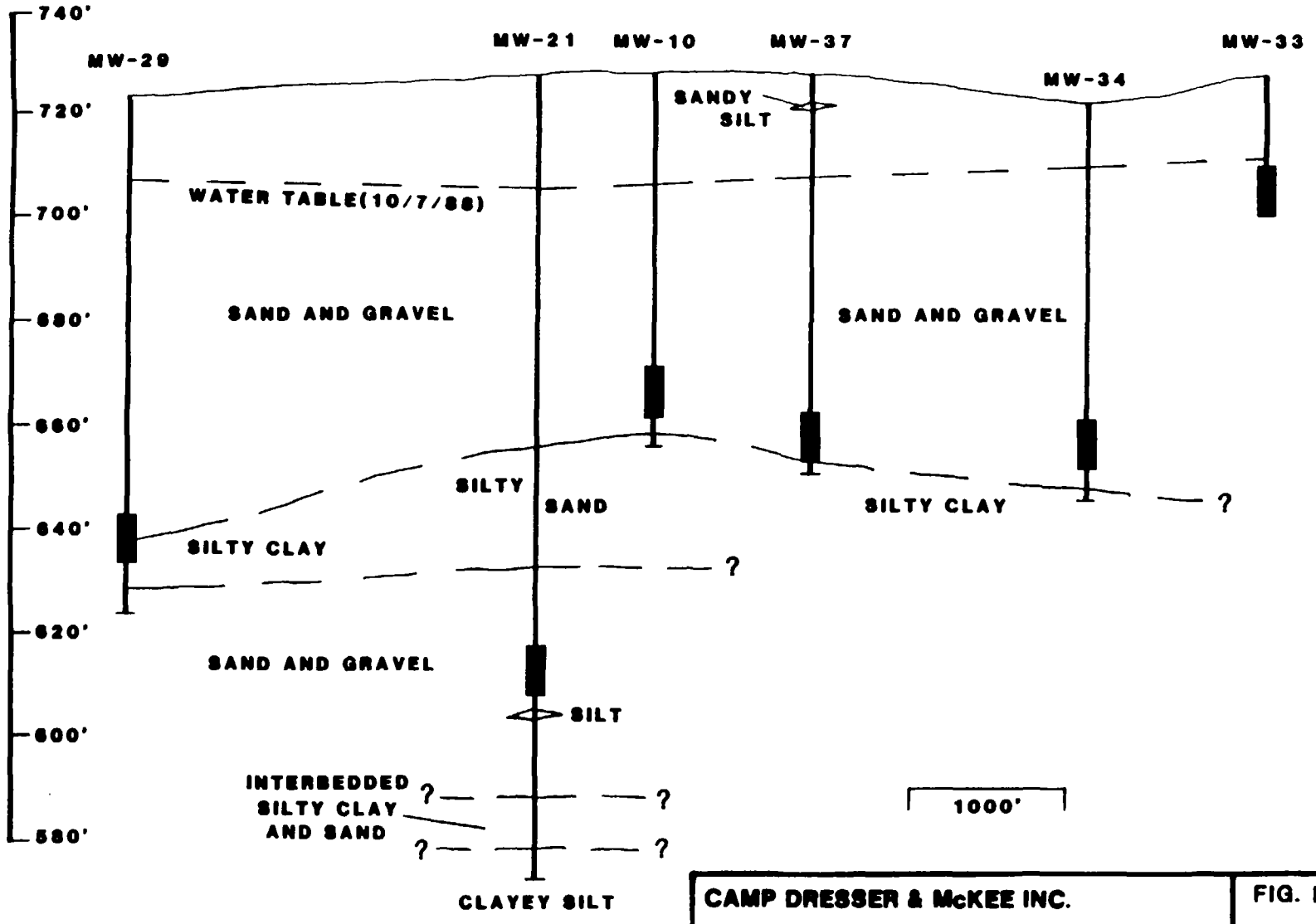

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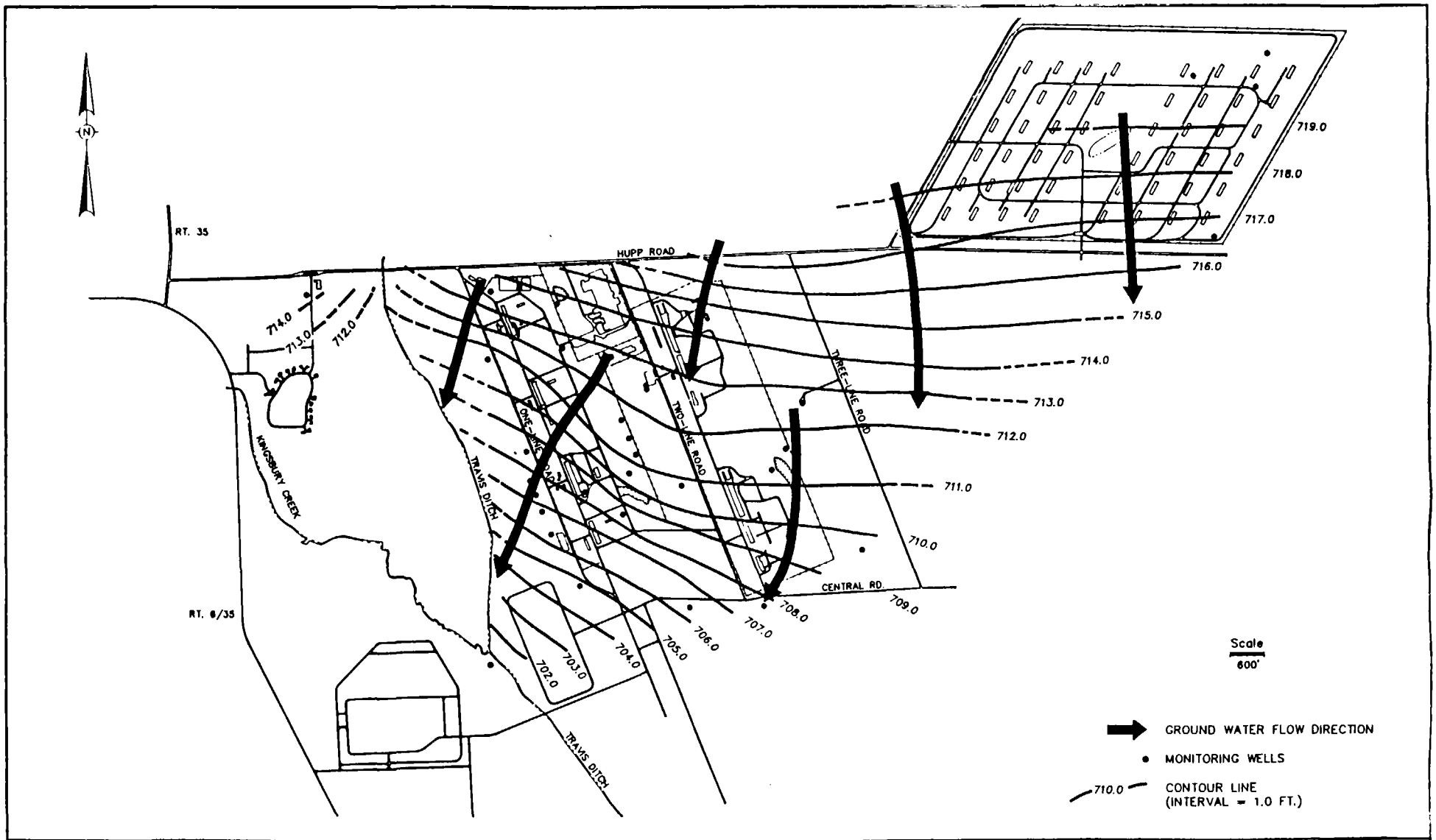
FIG. NO.
3.5-8

804176



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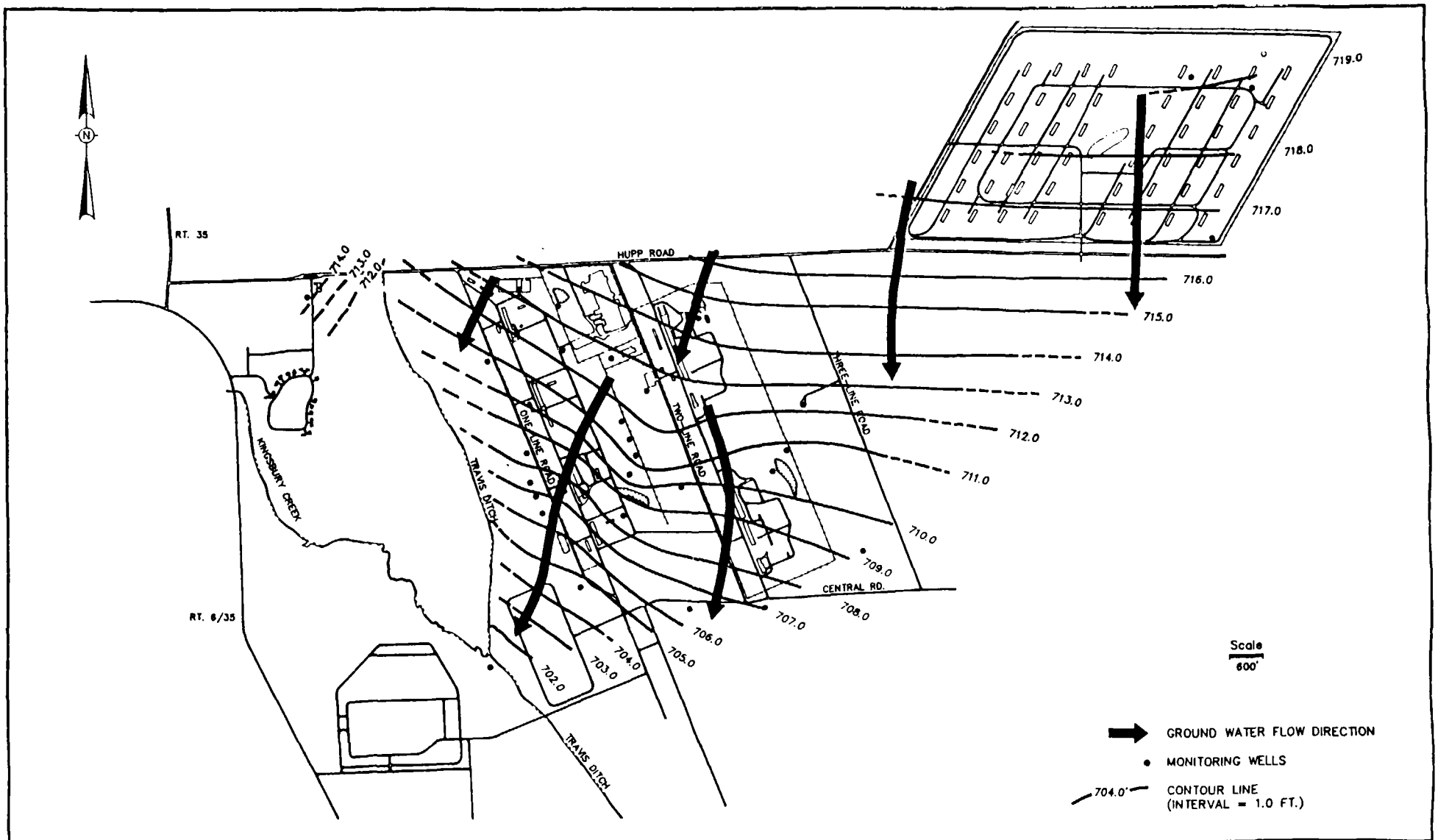
WATER TABLE MAP –
AUGUST 1988

FIGURE NO.

3.5-9



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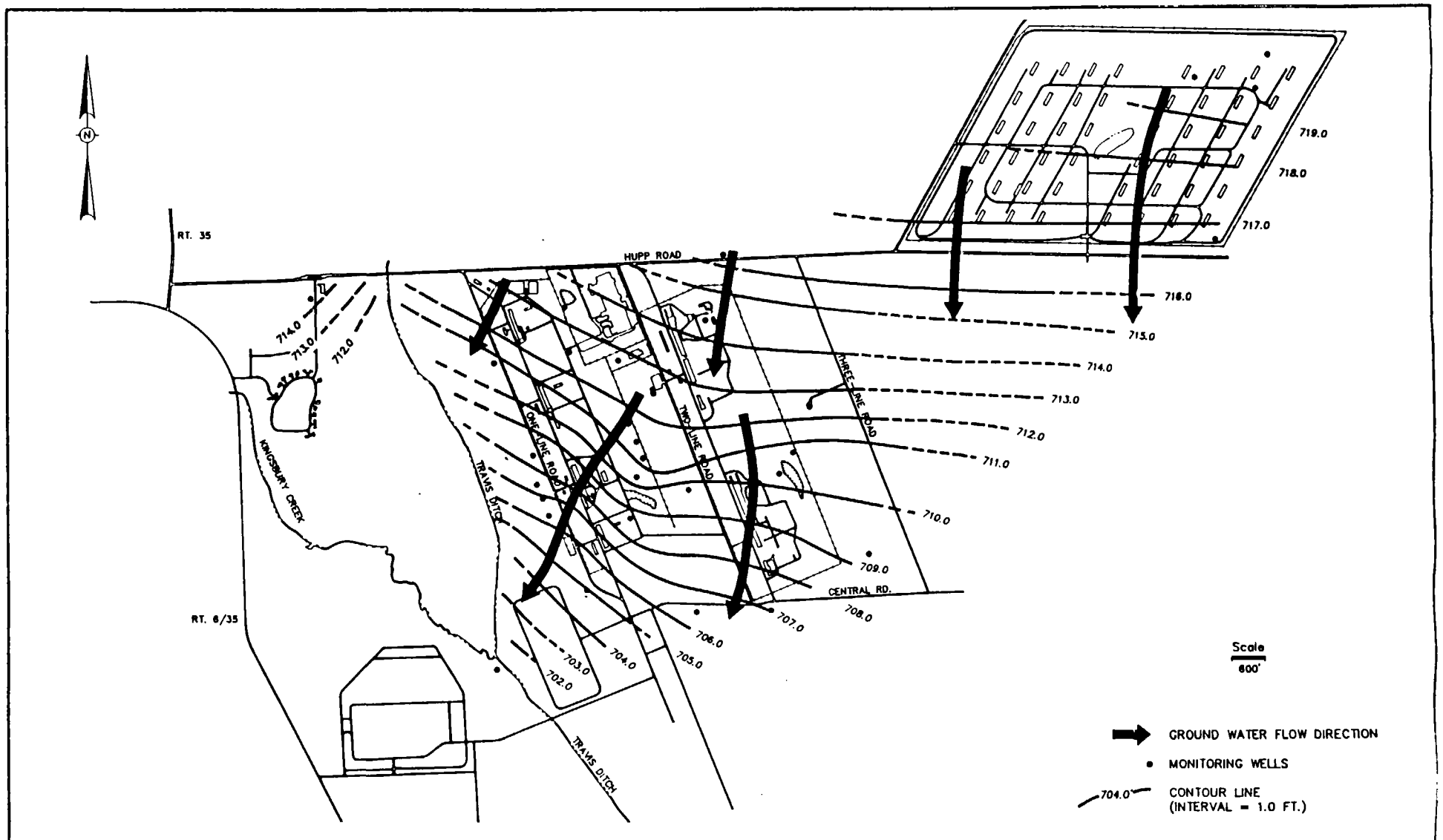
WATER TABLE MAP –
OCTOBER 7, 1988

FIGURE NO.
3.5-10



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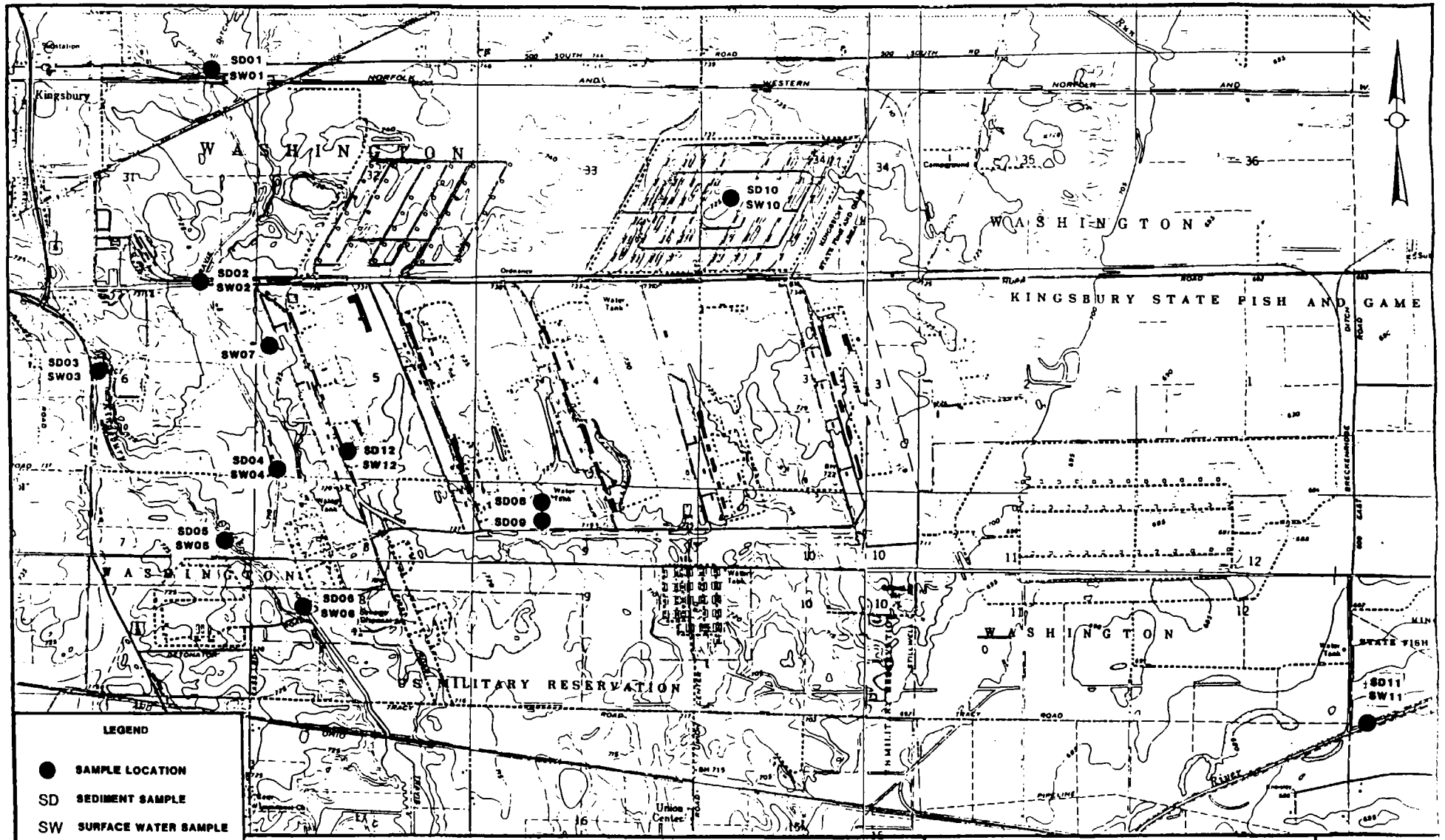
WATER TABLE MAP –
NOVEMBER 11, 1988

FIGURE NO.
3.5-11



SURFACE WATER / SEDIMENT
SAMPLE LOCATION MAP

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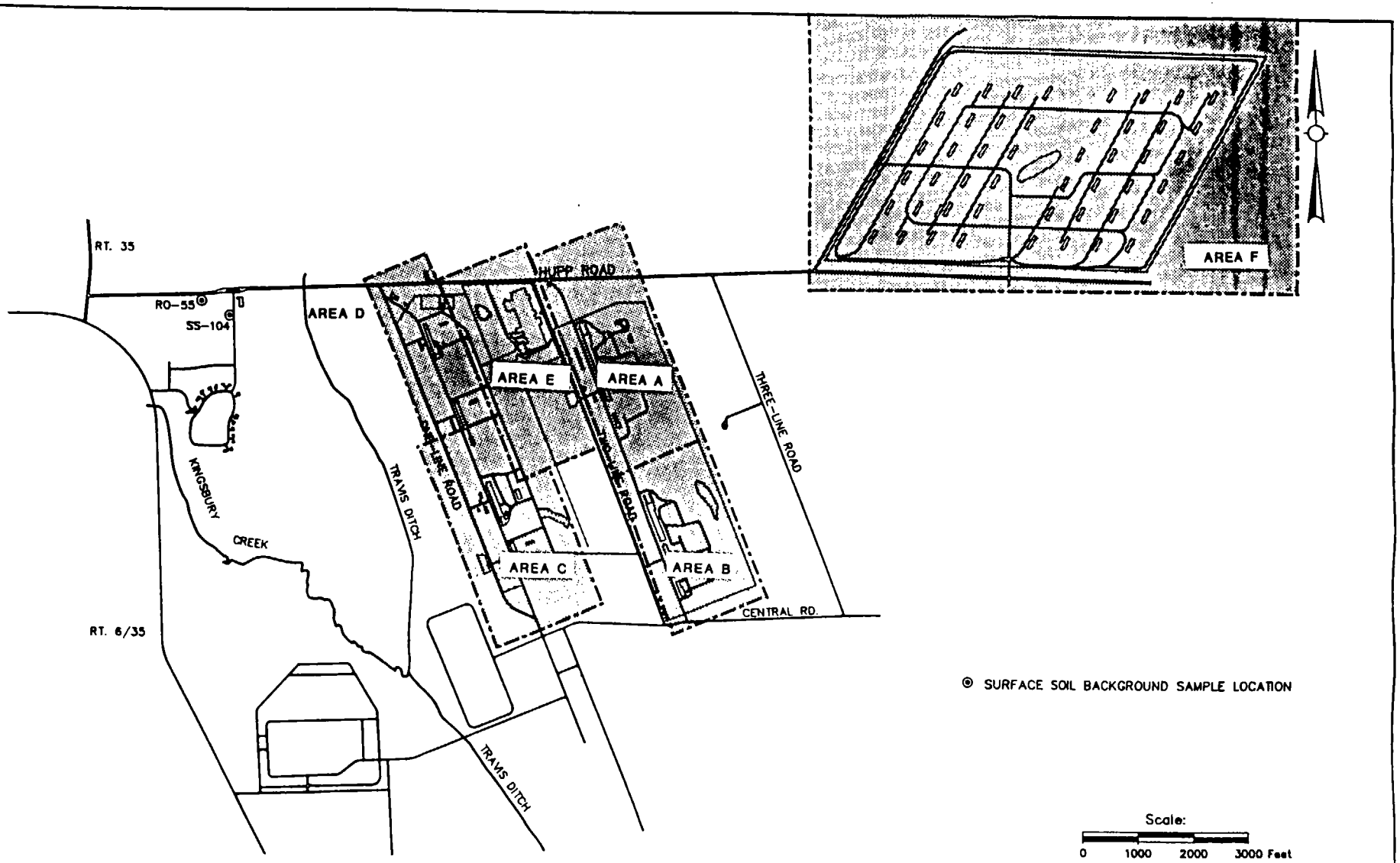
FIG. NO.
4.2-1



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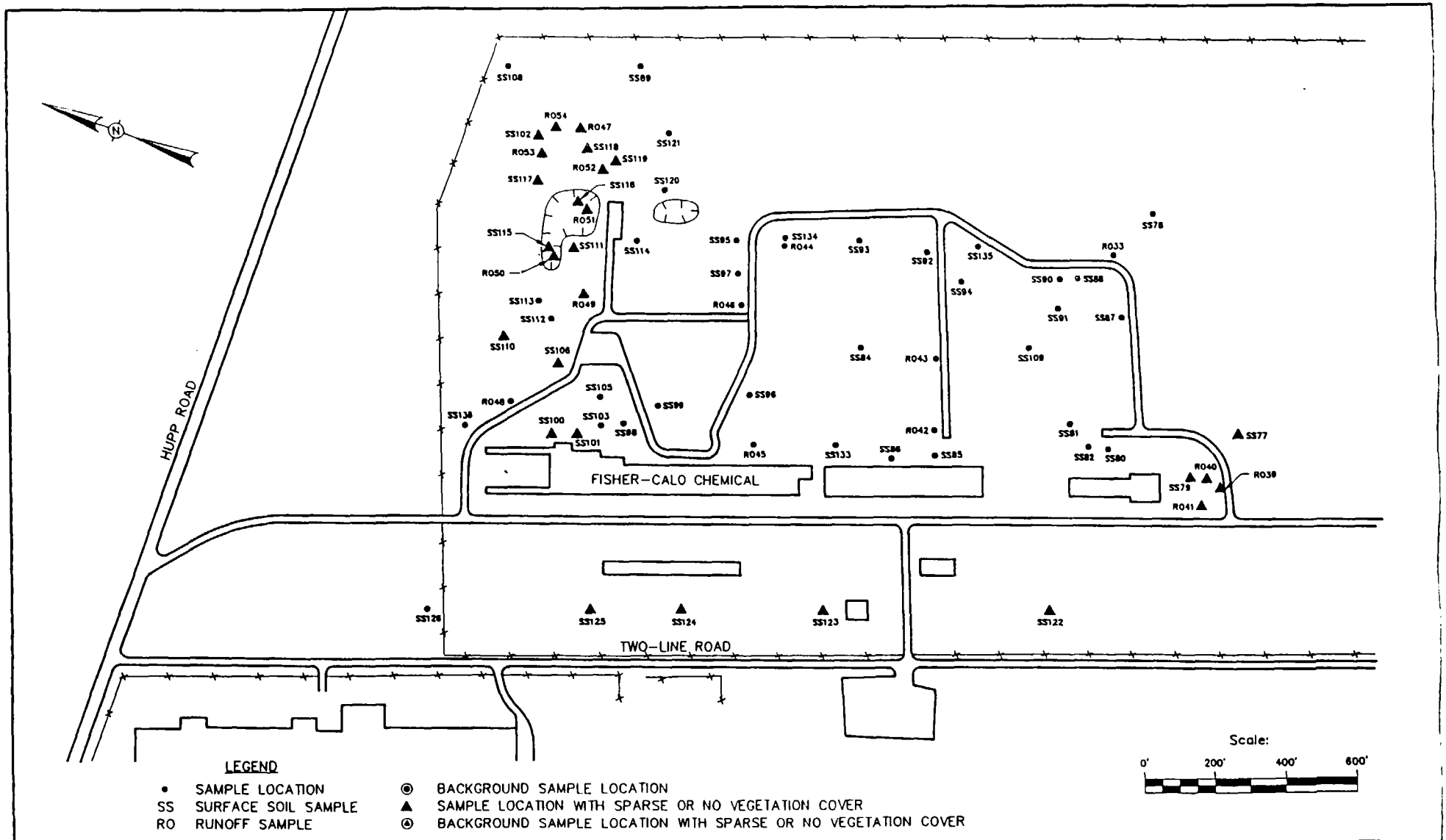
SITE AREA MAP

SURFACE SOIL SAMPLE AREA LOCATION

FIGURE NO.
4.3-1



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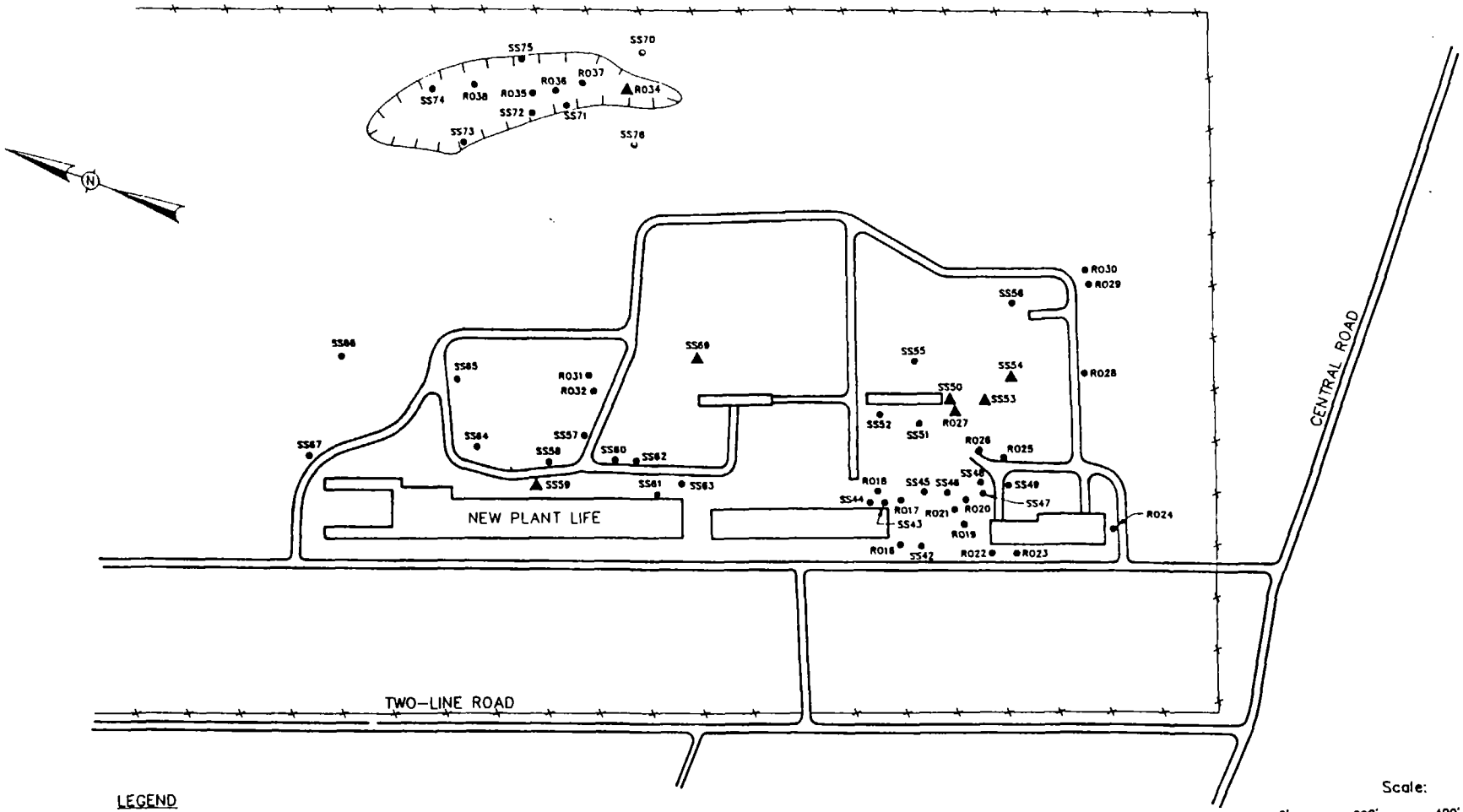
STUDY AREA A – FISHER–CALO PLANT

SURFACE SOIL AND RUNOFF SAMPLE LOCATION MAP

FIGURE NO.
4.3-2

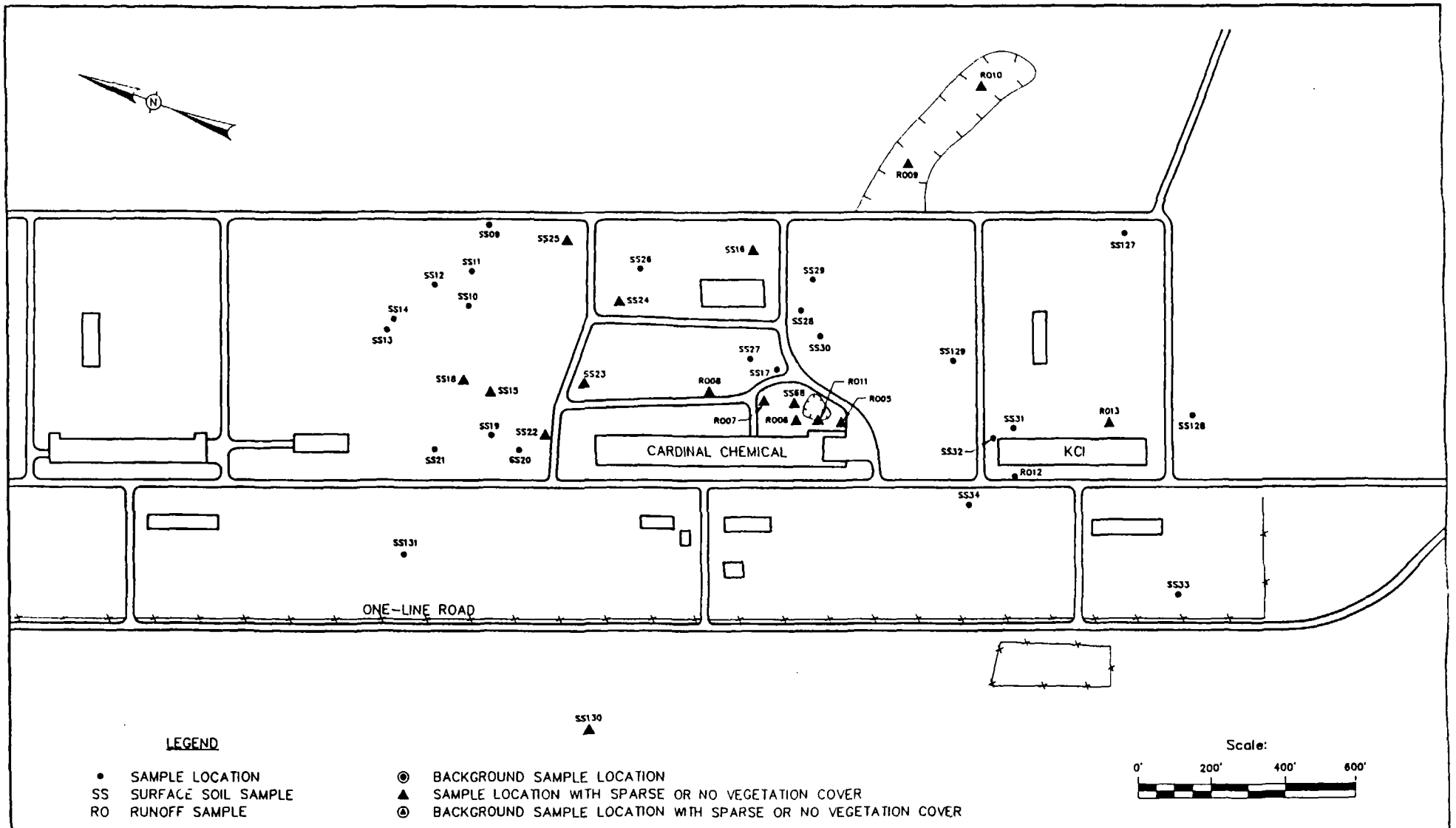


LEGEND

- • SAMPLE LOCATION
- SS SURFACE SOIL SAMPLE
- RO RUNOFF SAMPLE
- ◉ BACKGROUND SAMPLE LOCATION
- ▲ SAMPLE LOCATION WITH SPARSE OR NO VEGETATION COVER

Scale: 0' 200' 400' 600'

CDM environmental engineers, scientists, planners, & management consultants	STUDY AREA B – NEW PLANT LIFE	SURFACE SOIL AND RUNOFF SAMPLE LOCATION MAP	FIGURE NO. **4.3-3**



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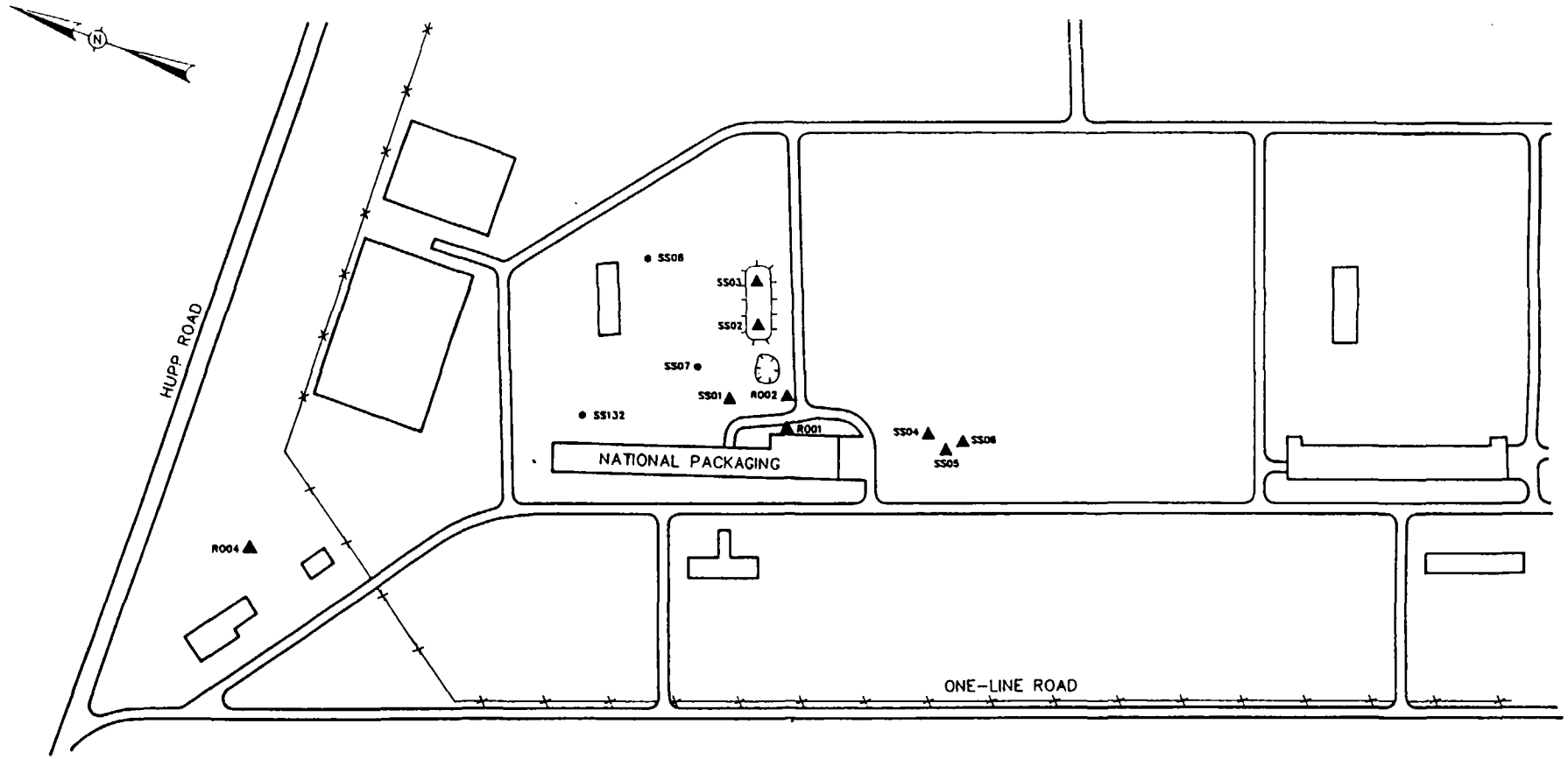
STUDY AREA C – CARDINAL CHEMICAL

SURFACE SOIL AND RUNOFF SAMPLE LOCATION MAP

FIGURE NO. **4.3-4**



LEGEND

- • SAMPLE LOCATION
- SS SURFACE SOIL SAMPLE
- RO RUNOFF SAMPLE
- ◉ BACKGROUND SAMPLE LOCATION
- ▲ SAMPLE LOCATION WITH SPARSE OR NO VEGETATION COVER

Scale: 0' 200' 400' 600'

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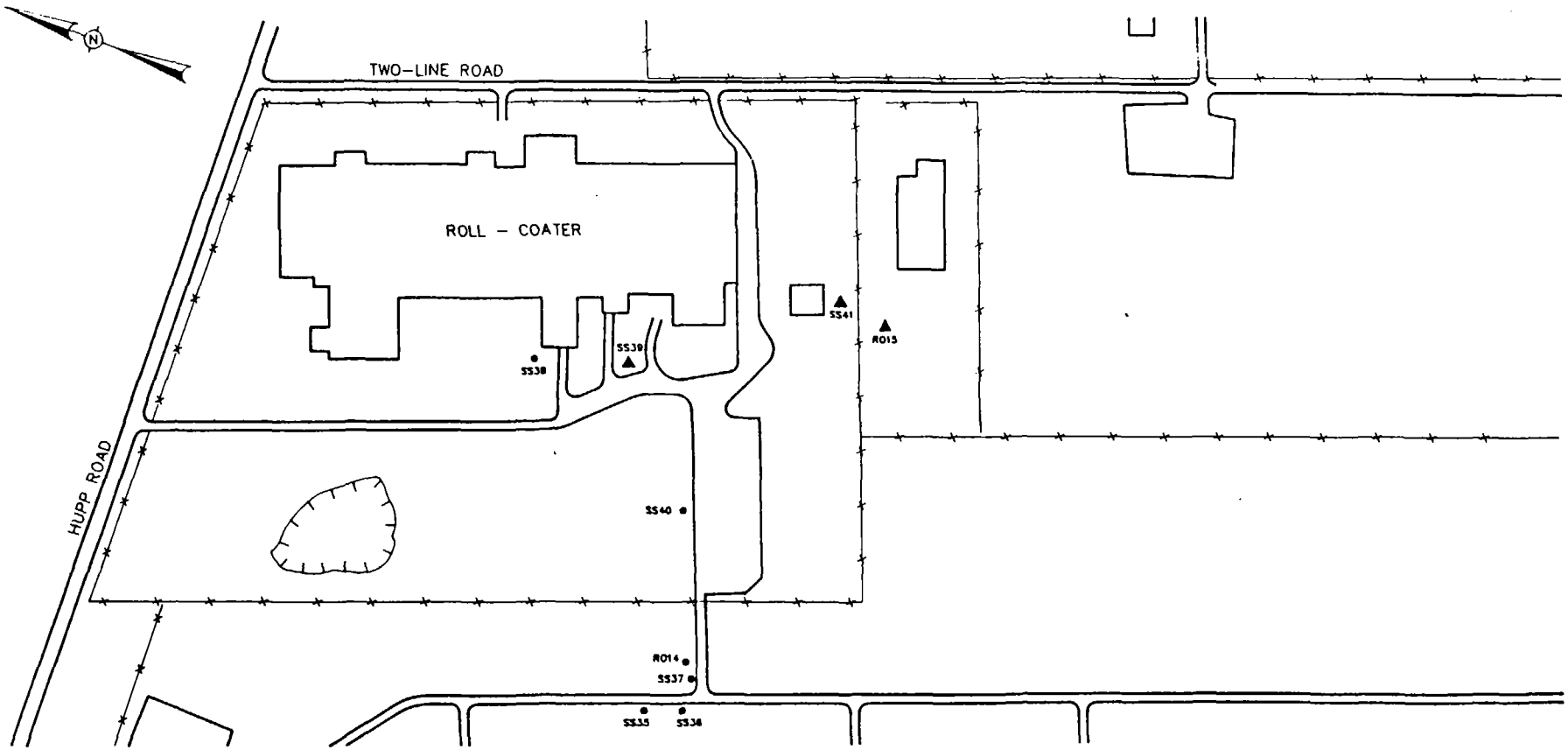
STUDY AREA D – NATIONAL PACKAGING

SURFACE SOIL AND RUNOFF SAMPLE LOCATION MAP

FIGURE NO. **4.3-5**



LEGEND

- • SAMPLE LOCATION
- SS SURFACE SOIL SAMPLE
- RO RUNOFF SAMPLE
- ◉ BACKGROUND SAMPLE LOCATION
- ▲ SAMPLE LOCATION WITH SPARSE OR NO VEGETATION COVER

Scale: 0' 200' 400' 600'

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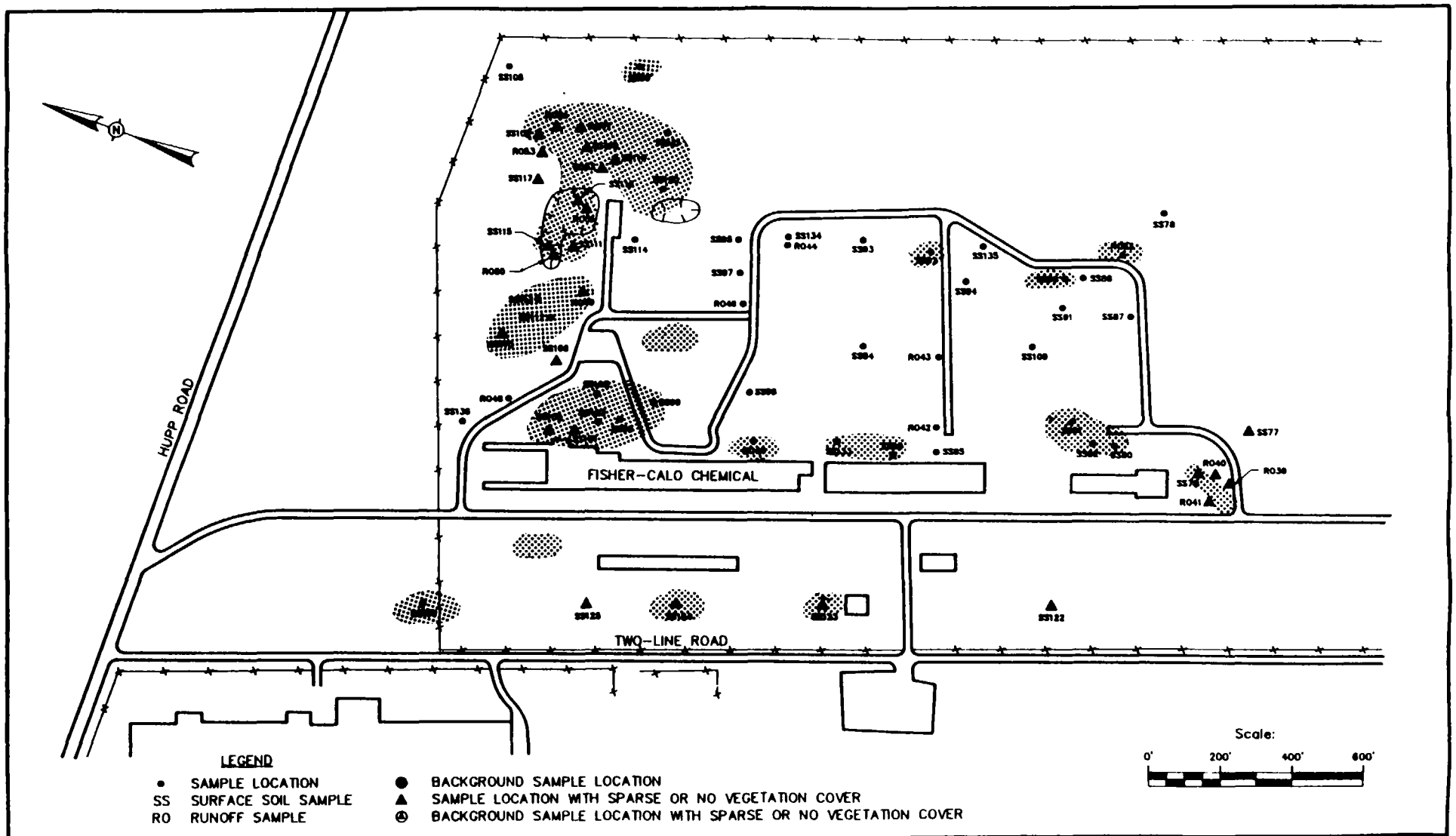
STUDY AREA E – ROLL–COATER

SURFACE SOIL AND RUNOFF SAMPLE LOCATION MAP

FIGURE NO. **4.3-6**



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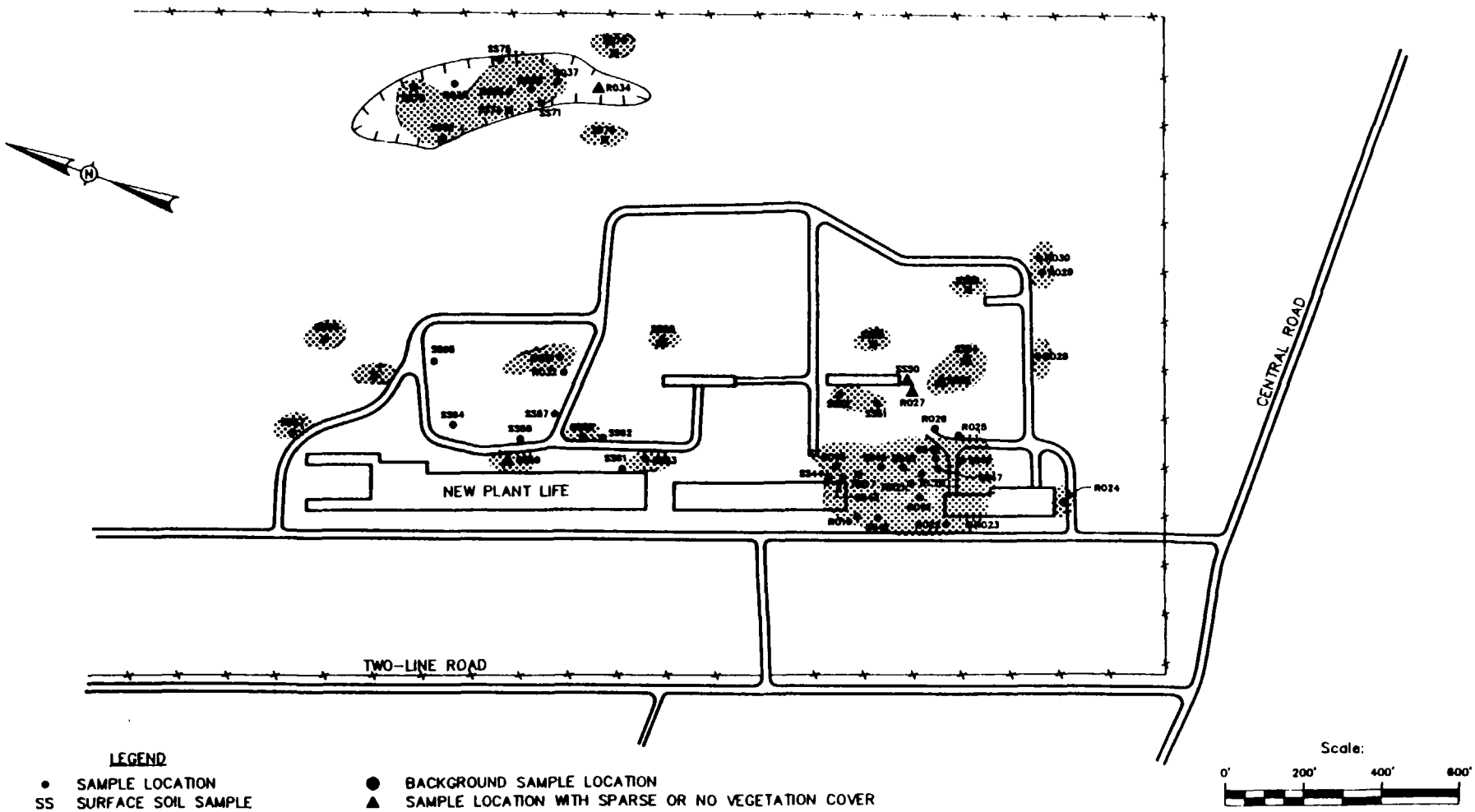
STUDY AREA A –
FISHER–CALO PLANT

EXTENT OF CONTAMINATION (TOTAL VOA/BNA) IN SURFACE AND RUN-OFF SOILS

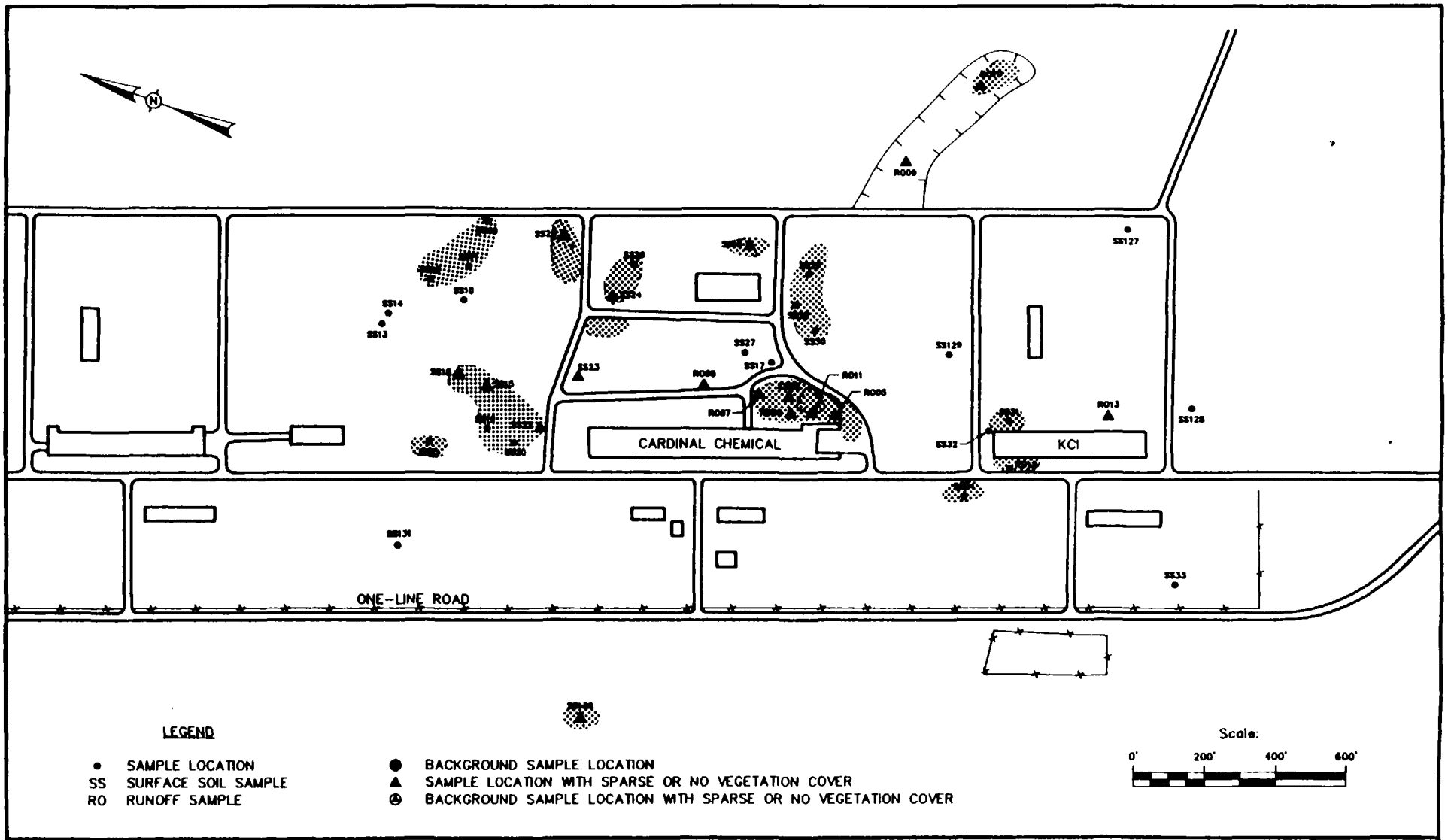
FIGURE NO.
4.3-7



LEGEND

- • SAMPLE LOCATION
- SS SURFACE SOIL SAMPLE
- RO RUNOFF SAMPLE
- ● BACKGROUND SAMPLE LOCATION
- ▲ SAMPLE LOCATION WITH SPARSE OR NO VEGETATION COVER

CDM *environmental engineers, scientists, planners, & management consultants*	STUDY AREA B – NEW PLANT LIFE	**EXTENT OF CONTAMINATION (TOTAL VOA/BNA) IN SURFACE AND RUN-OFF SOILS**	FIGURE NO. **4.3-8**



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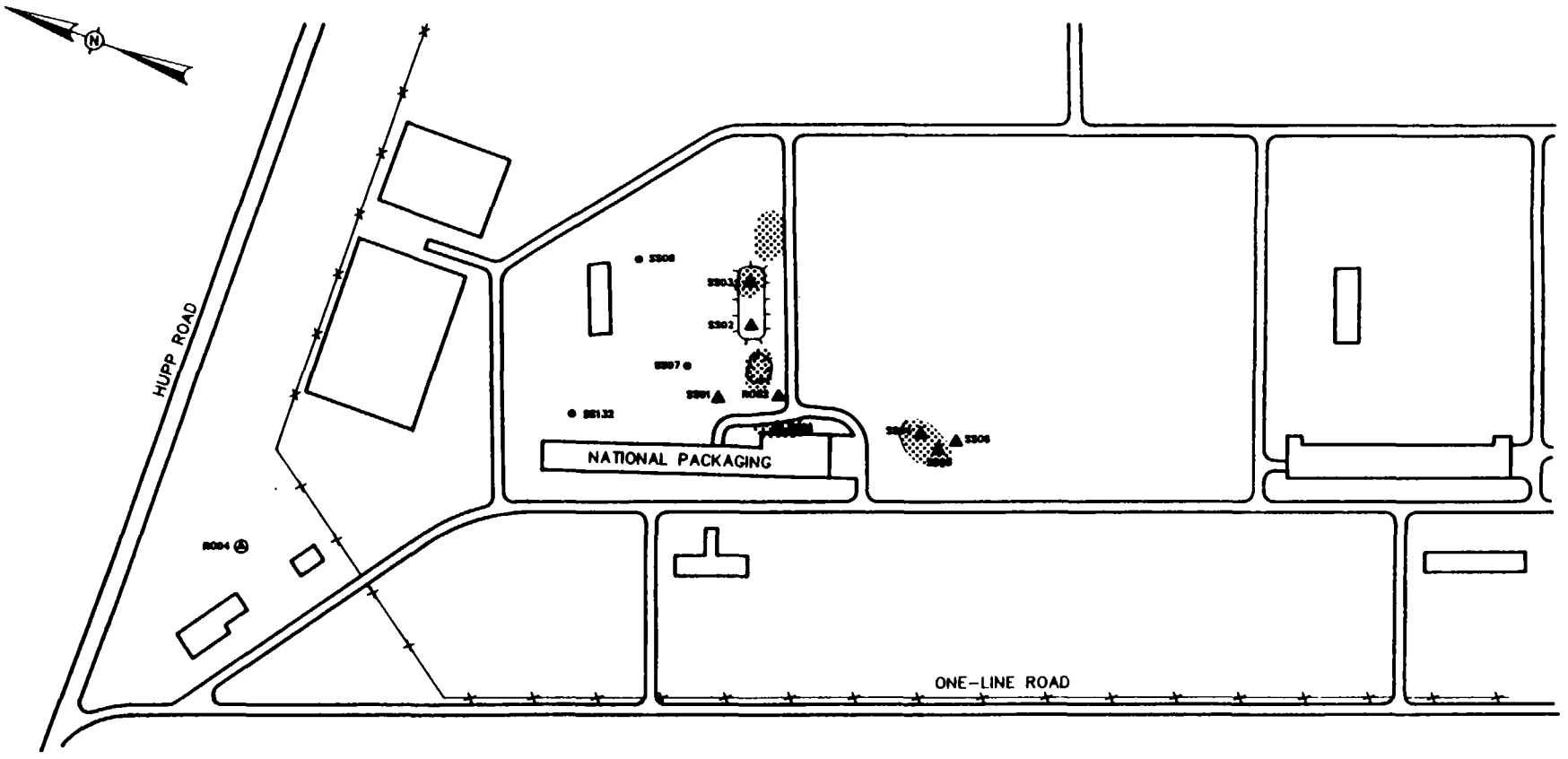
STUDY AREA C –
CARDINAL CHEMICAL

EXTENT OF CONTAMINATION (TOTAL VOA/BNA) IN SURFACE AND RUN-OFF SOILS

FIGURE NO.
4.3-9



LEGEND

- • SAMPLE LOCATION
- SS SURFACE SOIL SAMPLE
- RO RUNOFF SAMPLE
- ● BACKGROUND SAMPLE LOCATION
- ▲ SAMPLE LOCATION WITH SPARSE OR NO VEGETATION COVER
- ⊛ BACKGROUND SAMPLE LOCATION WITH SPARSE OR NO VEGETATION COVER

Scale:

0' 200' 400' 600'

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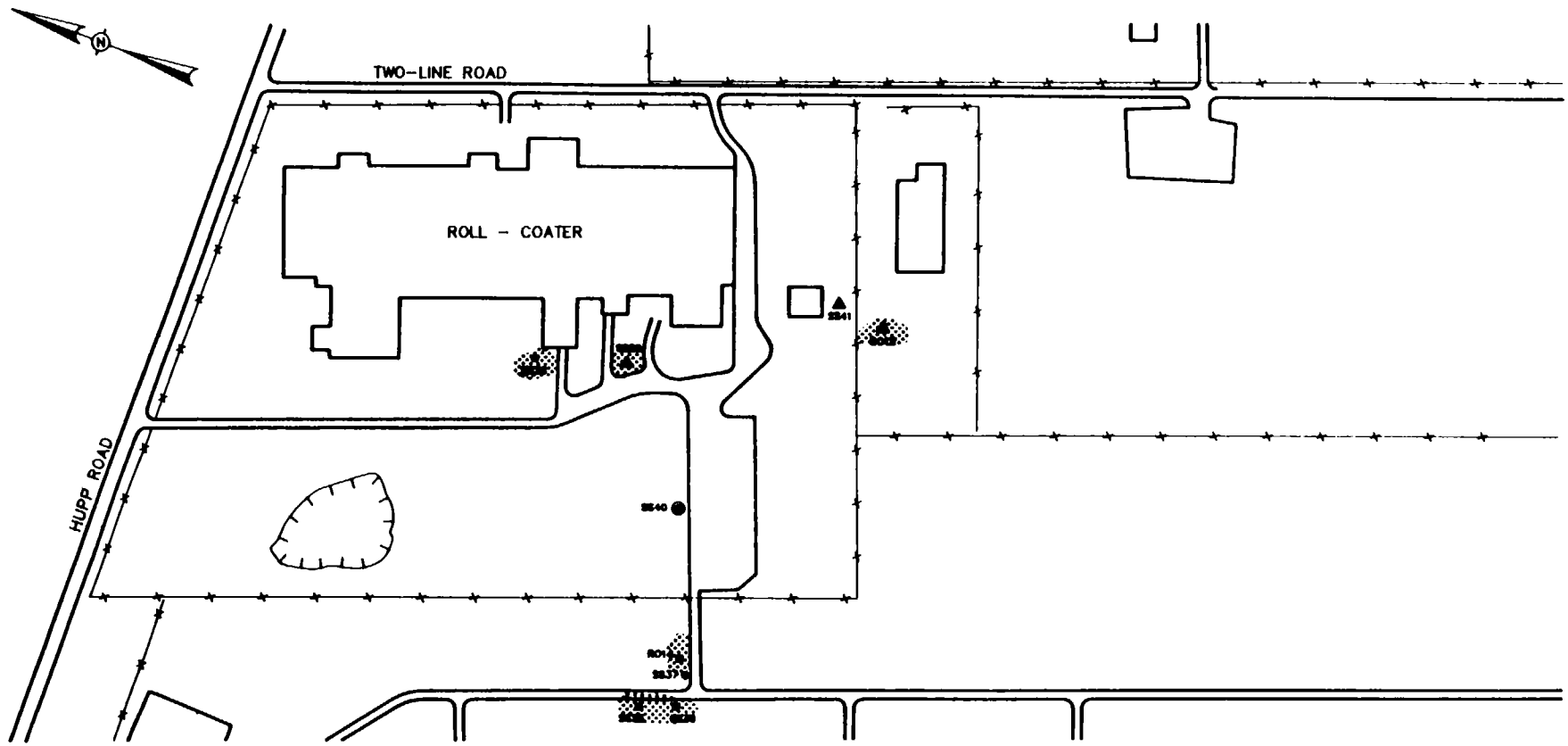
STUDY AREA D – NATIONAL PACKAGING

EXTENT OF CONTAMINATION (TOTAL VOA/BNA) IN SURFACE AND RUN-OFF SOILS

FIGURE NO.

4.3-10



LEGEND

- • SAMPLE LOCATION
- SS SURFACE SOIL SAMPLE
- RO RUNOFF SAMPLE
- ● BACKGROUND SAMPLE LOCATION
- ▲ SAMPLE LOCATION WITH SPARSE OR NO VEGETATION COVER

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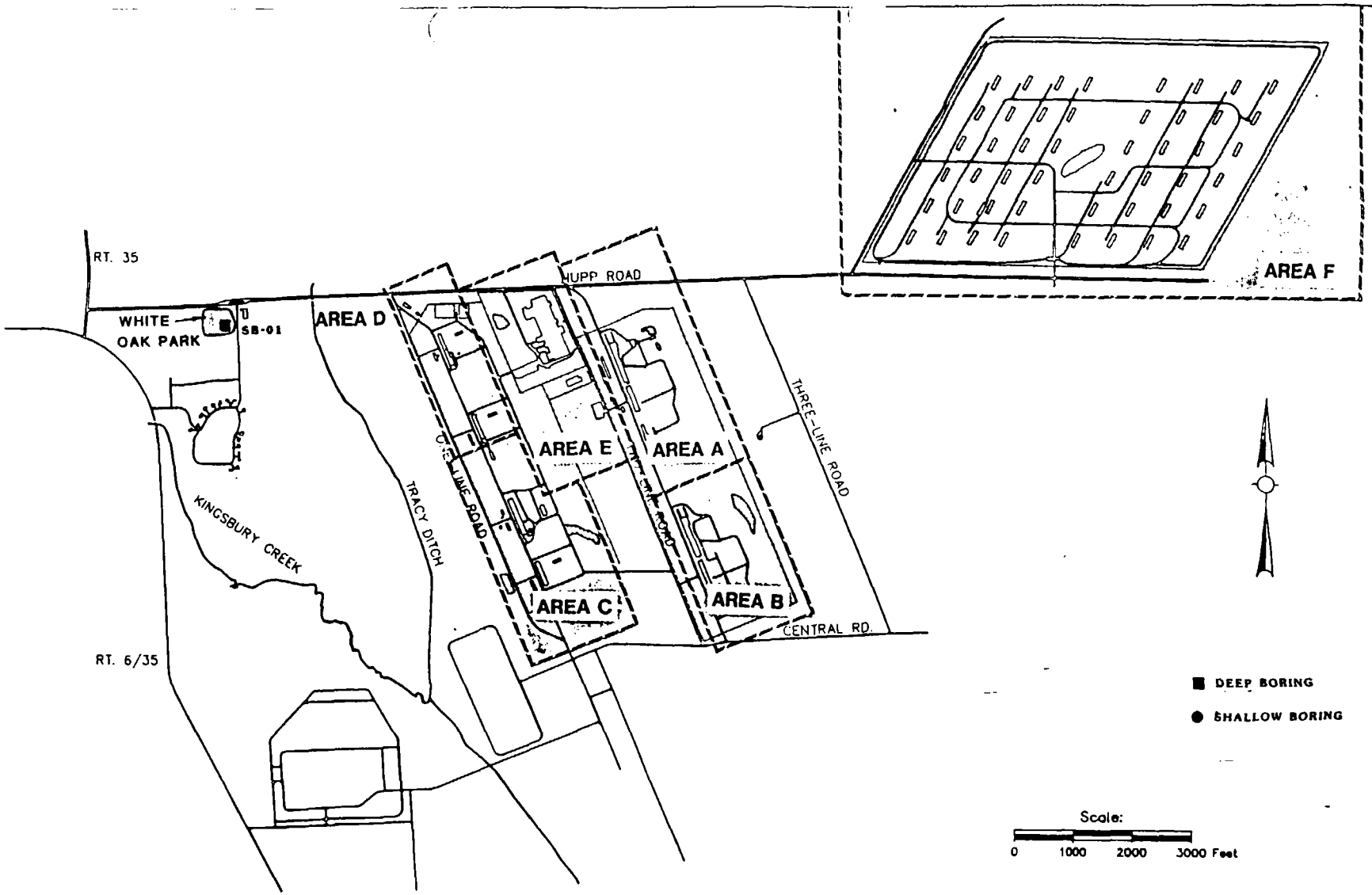
STUDY AREA E – ROLL-COATER

EXTENT OF CONTAMINATION (TOTAL VOA/BNA) IN SURFACE AND RUN-OFF SOILS

FIGURE NO.
4.3-11



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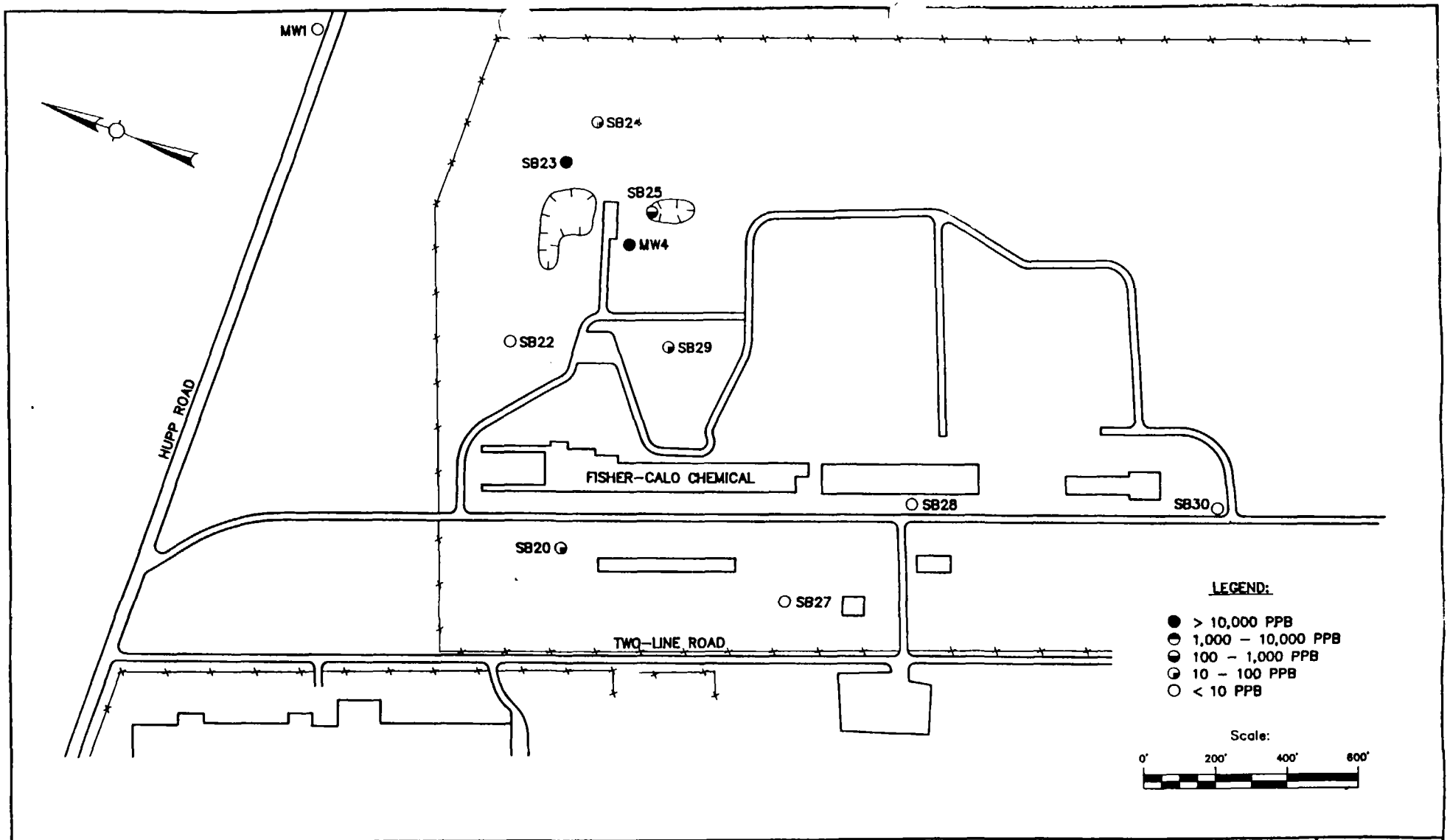
SAMPLING AREA MAP

FIGURE NO.
4.4-1



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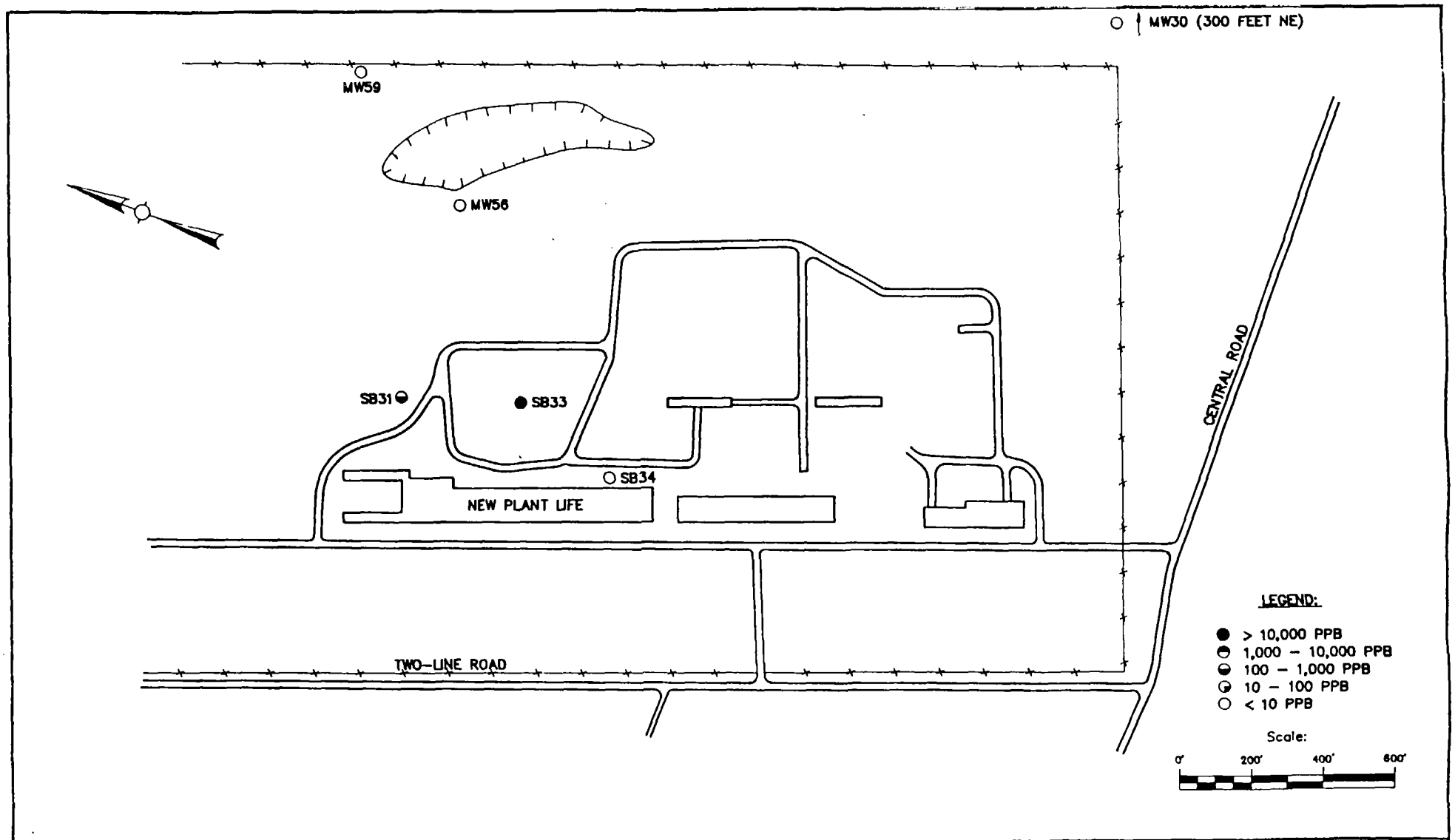
STUDY AREA A - FISHER-CALO PLANT

TOTAL VOLATILE ORGANICS: PEAK LEVELS OF SUBSURFACE SOIL SAMPLES, PPB

FIGURE NO.
4.4-2



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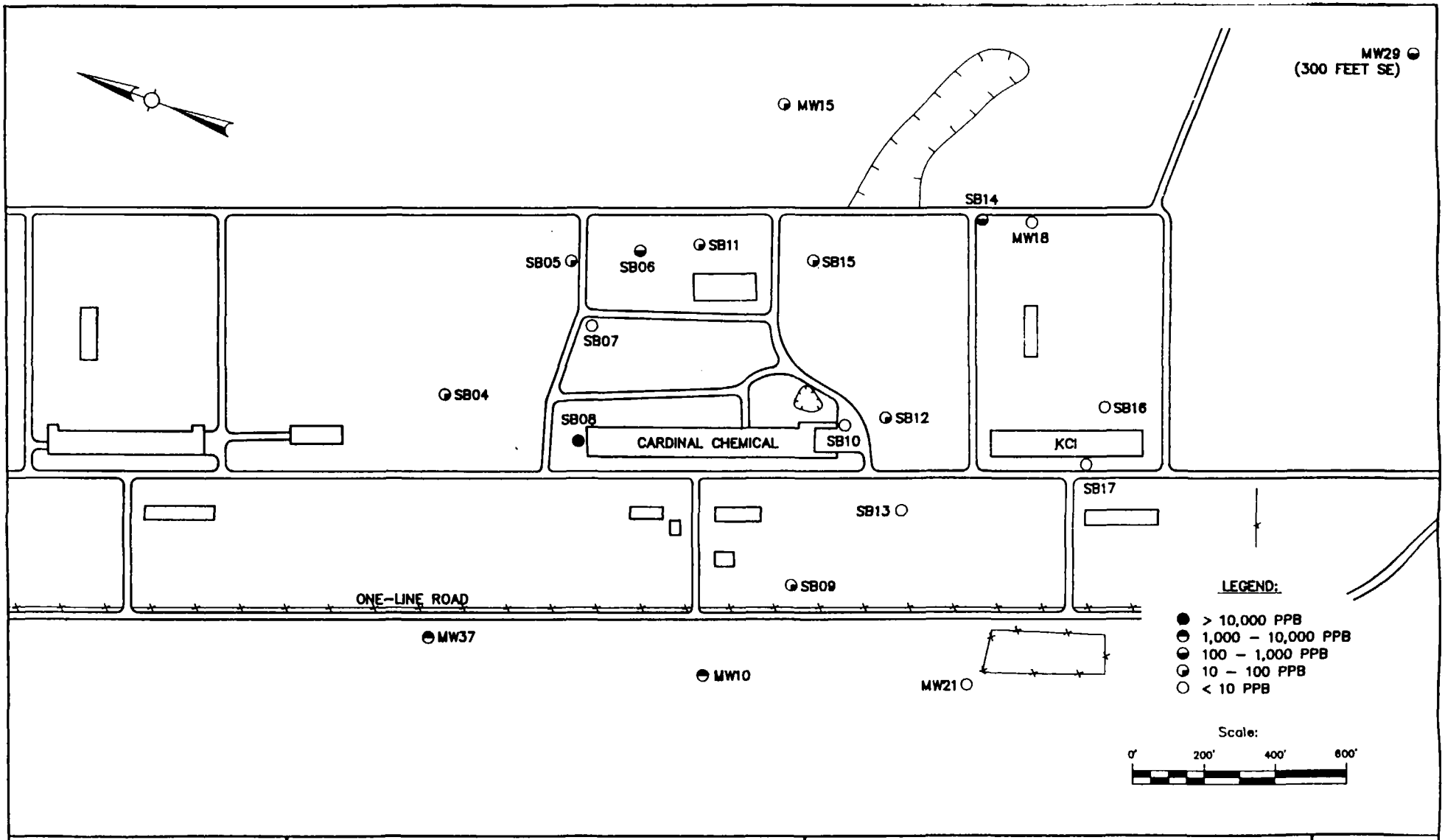
STUDY AREA B –
NEW PLANT LIFE

TOTAL VOLATILE ORGANICS:
PEAK LEVELS OF SUBSURFACE SOIL SAMPLES, PPB

FIGURE NO.
4.4-3



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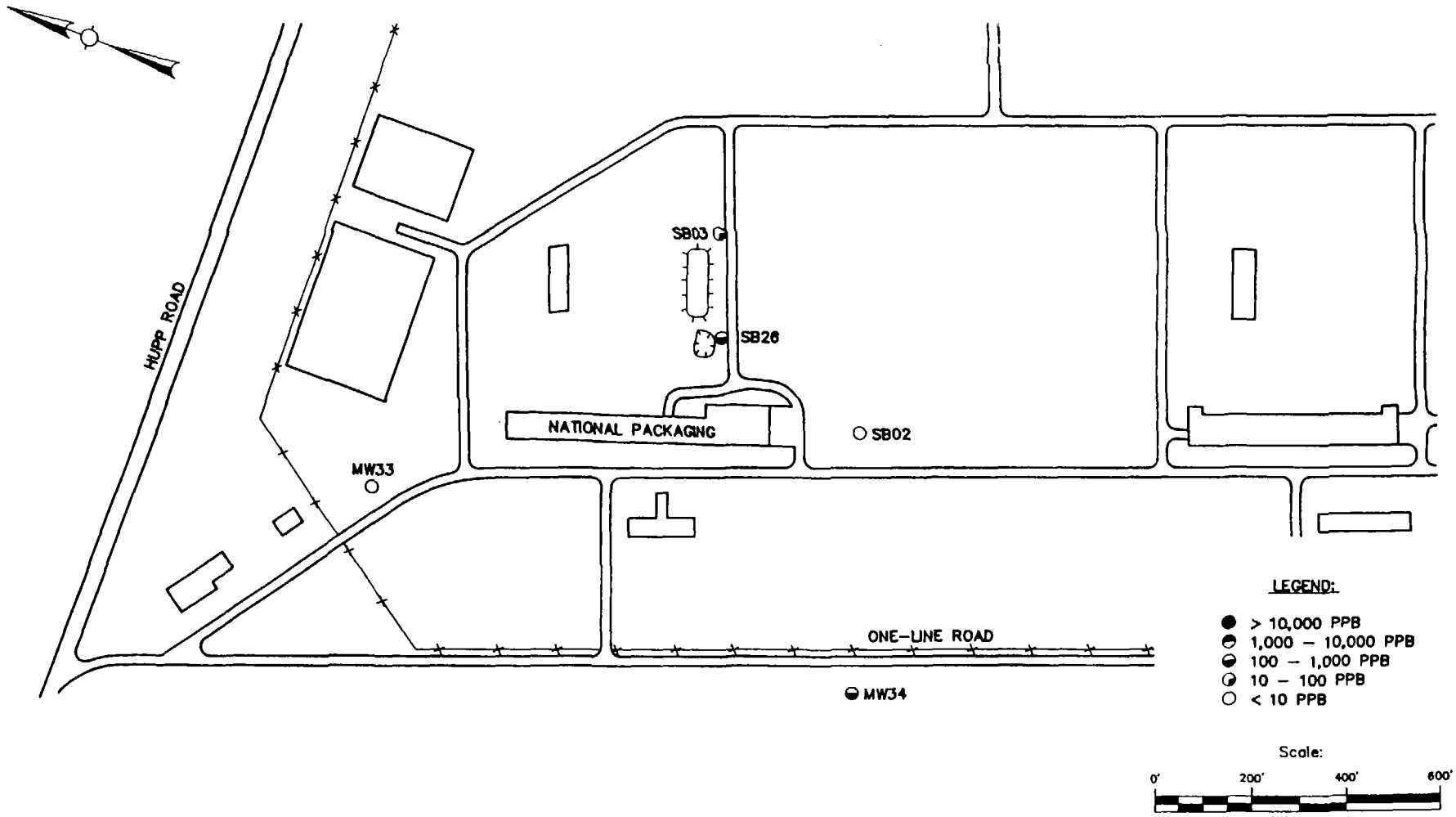
STUDY AREA C –
CARDINAL CHEMICAL

TOTAL VOLATILE ORGANICS:
PEAK LEVELS OF SUBSURFACE SOIL
SAMPLES, PPB

FIGURE NO.
4.4-4



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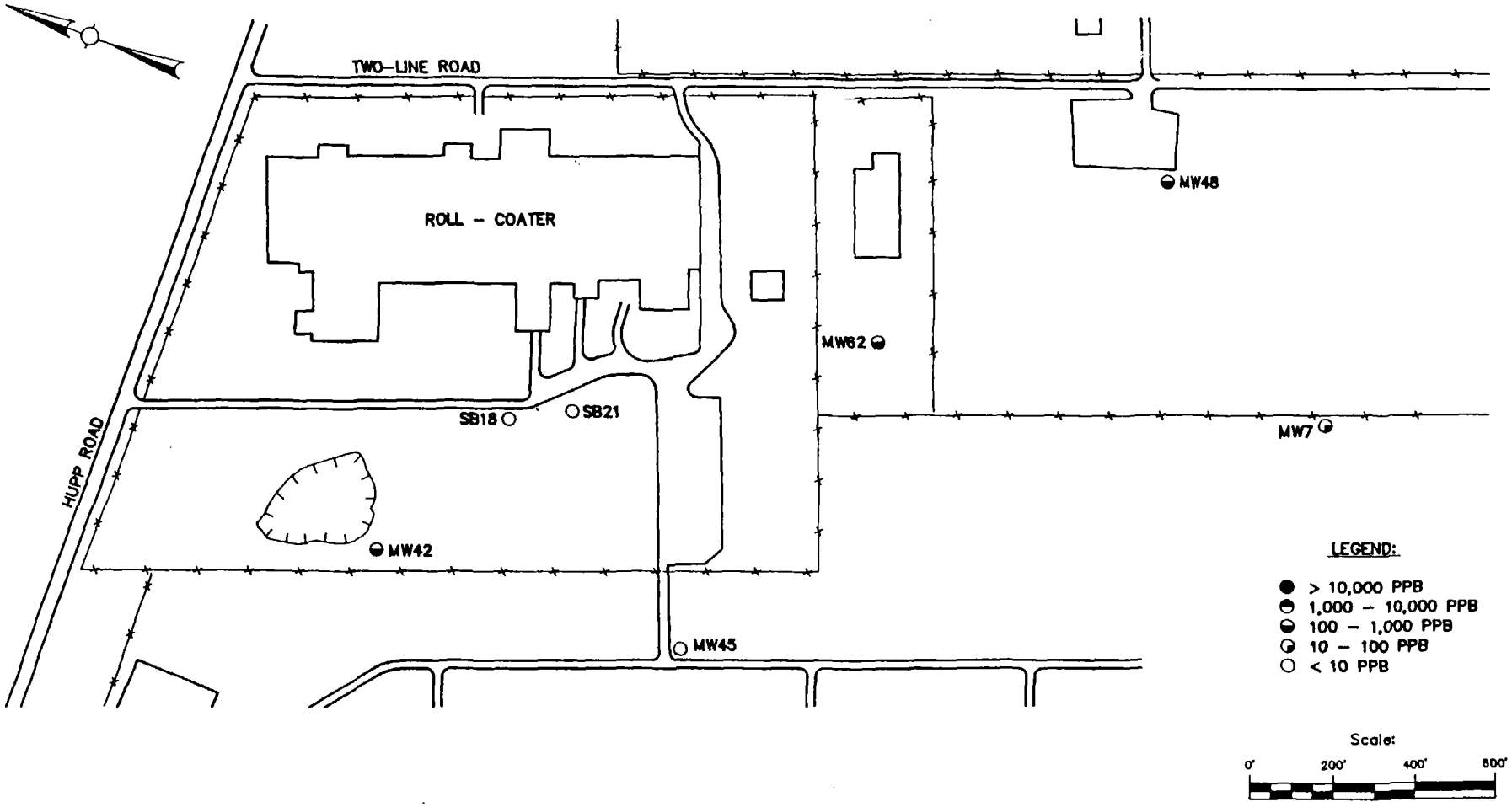
STUDY AREA D –
NATIONAL PACKAGING

TOTAL VOLATILE ORGANICS:
PEAK LEVELS OF SUBSURFACE SOIL
SAMPLES, PPB

FIGURE NO.
4.4-5



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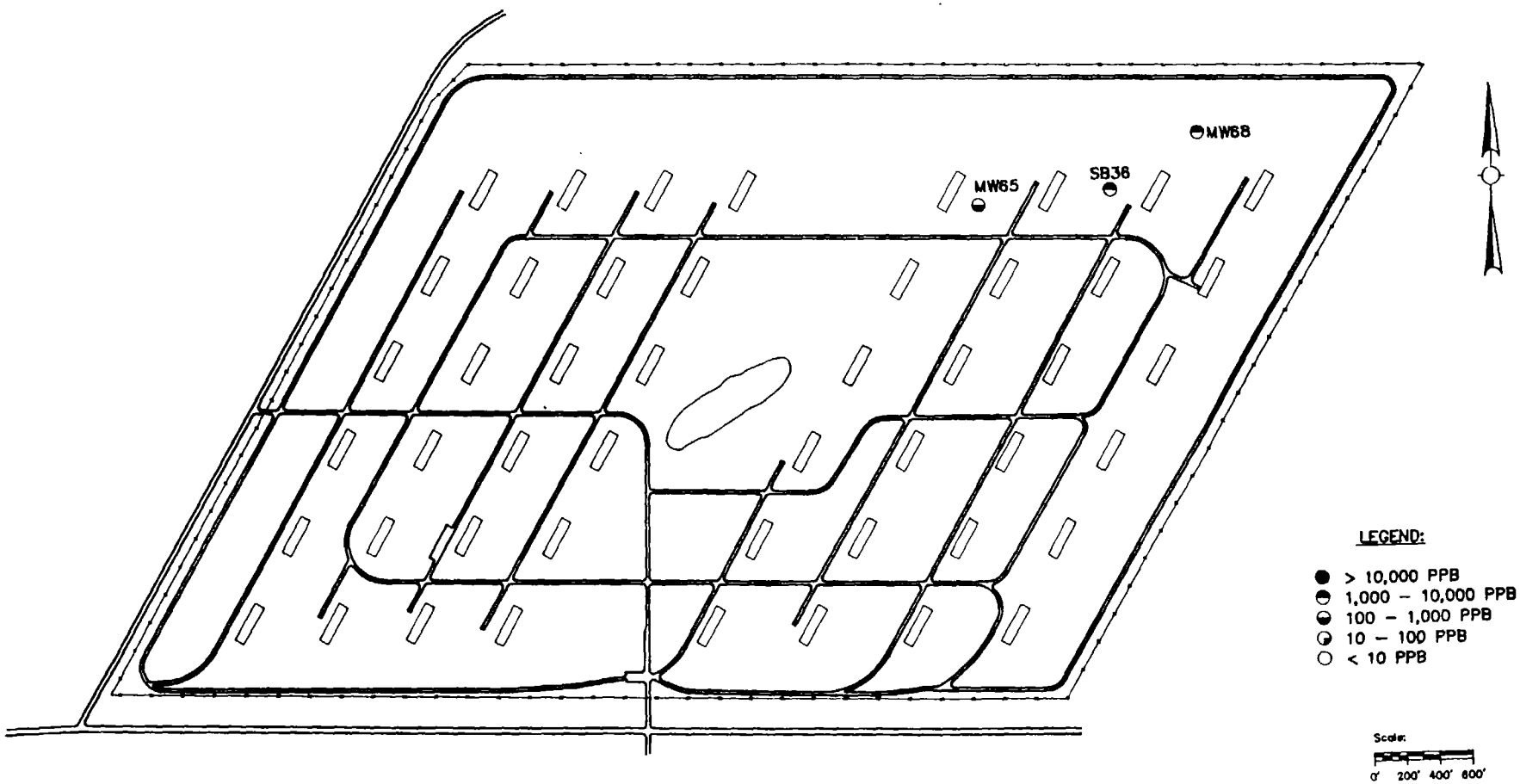
STUDY AREA E - ROLL-COATER

TOTAL VOLATILE ORGANICS: PEAK LEVELS OF SUBSURFACE SOIL SAMPLES, PPB

FIGURE NO.
4.4-6



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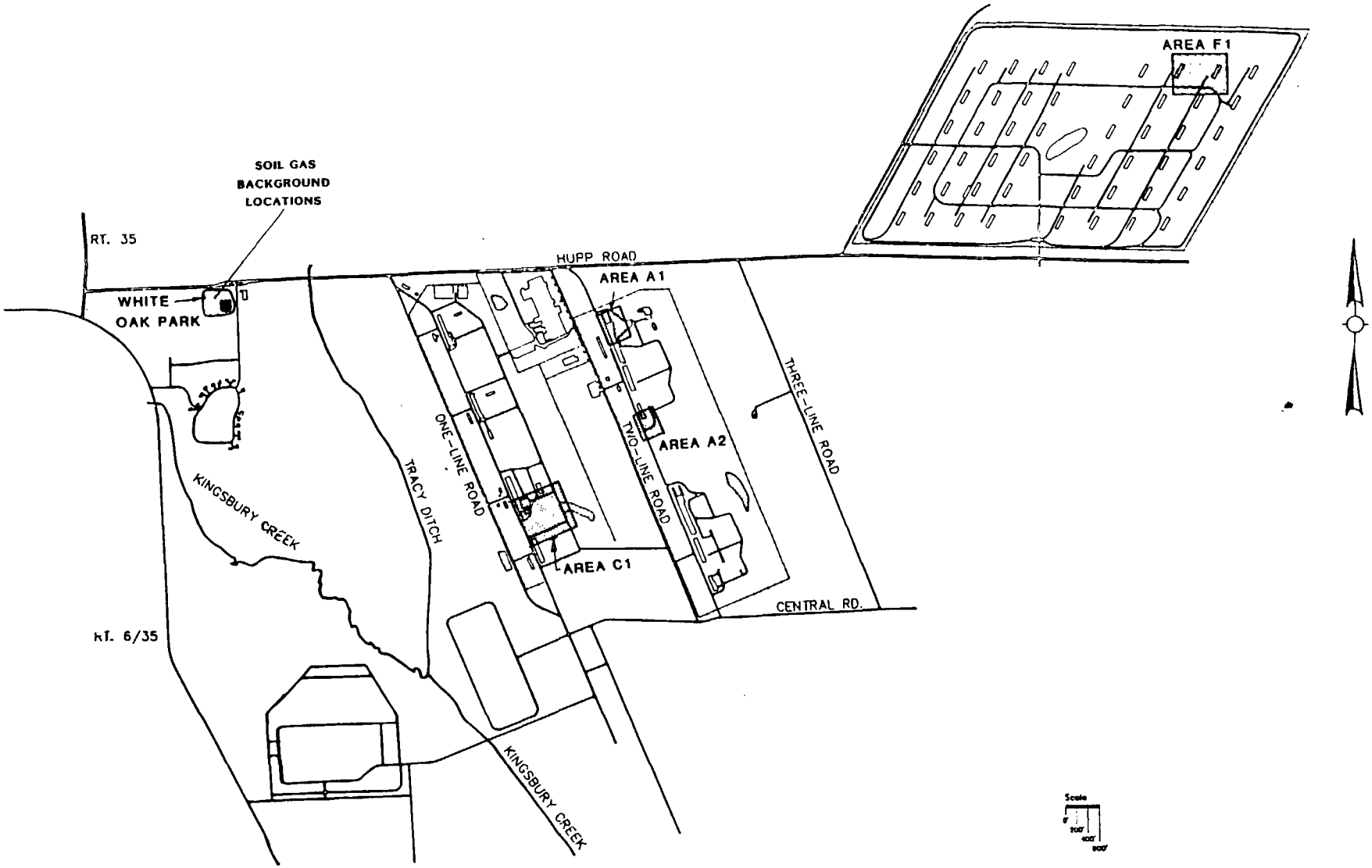
STUDY AREA F – SPACE LEASING

TOTAL VOLATILE ORGANICS: PEAK LEVELS OF SUBSURFACE SOIL SAMPLES, PPB

FIGURE NO.
4.4-7



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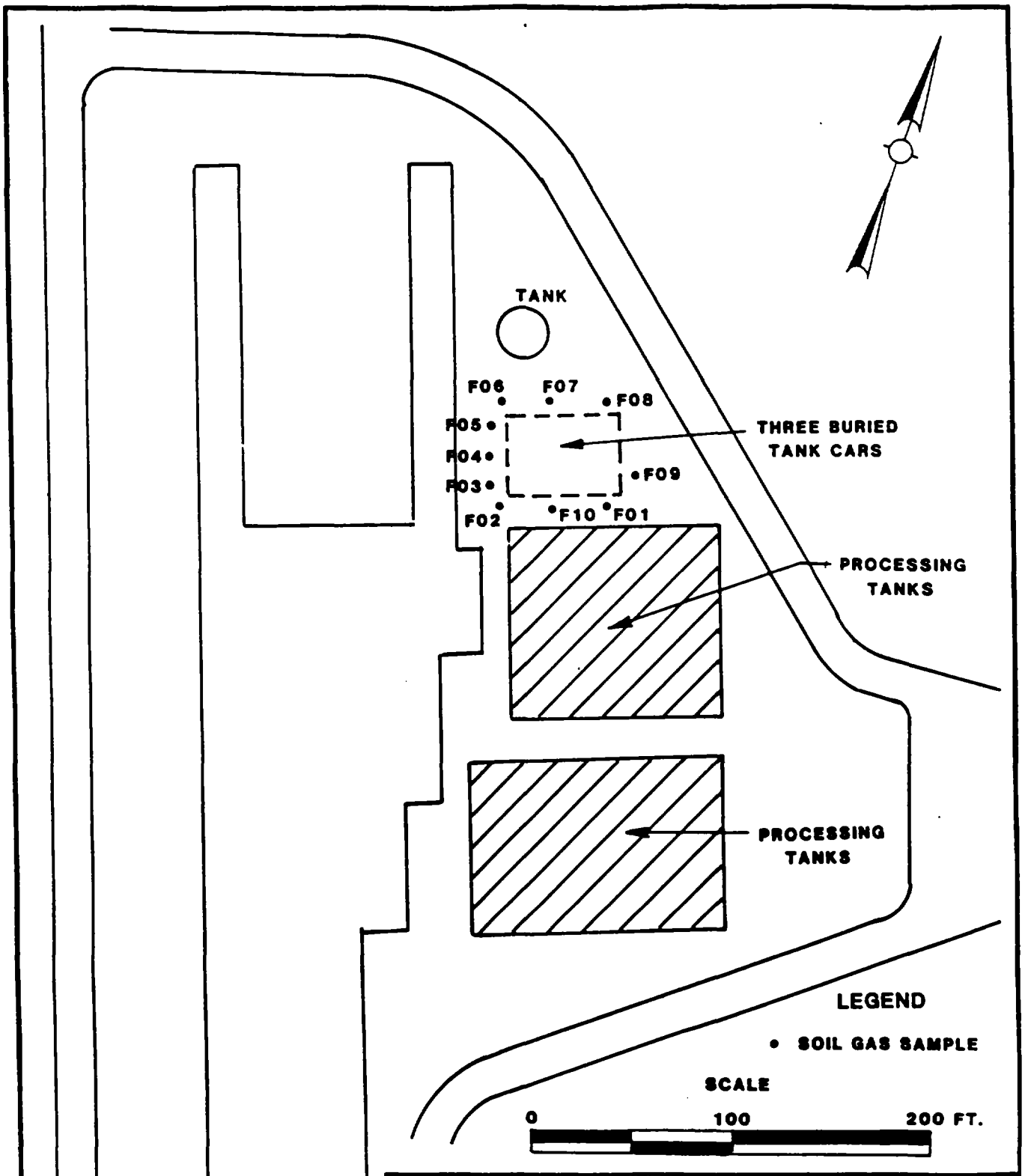
SOIL GAS SURVEY LOCATION MAP

FIGURE NO.

4.4-8



SOIL GAS SAMPLE
LOCATION MAP-AREA A1

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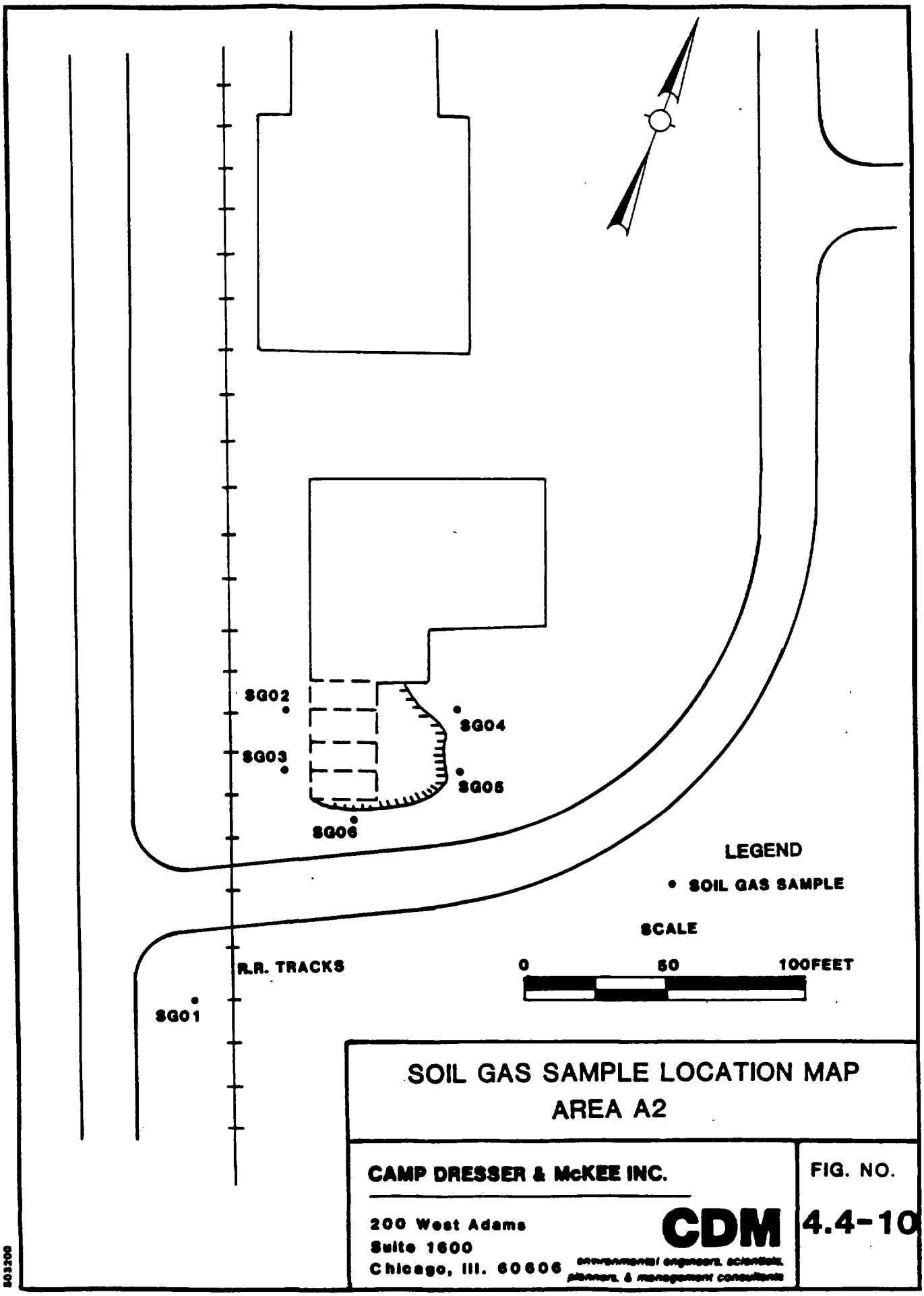
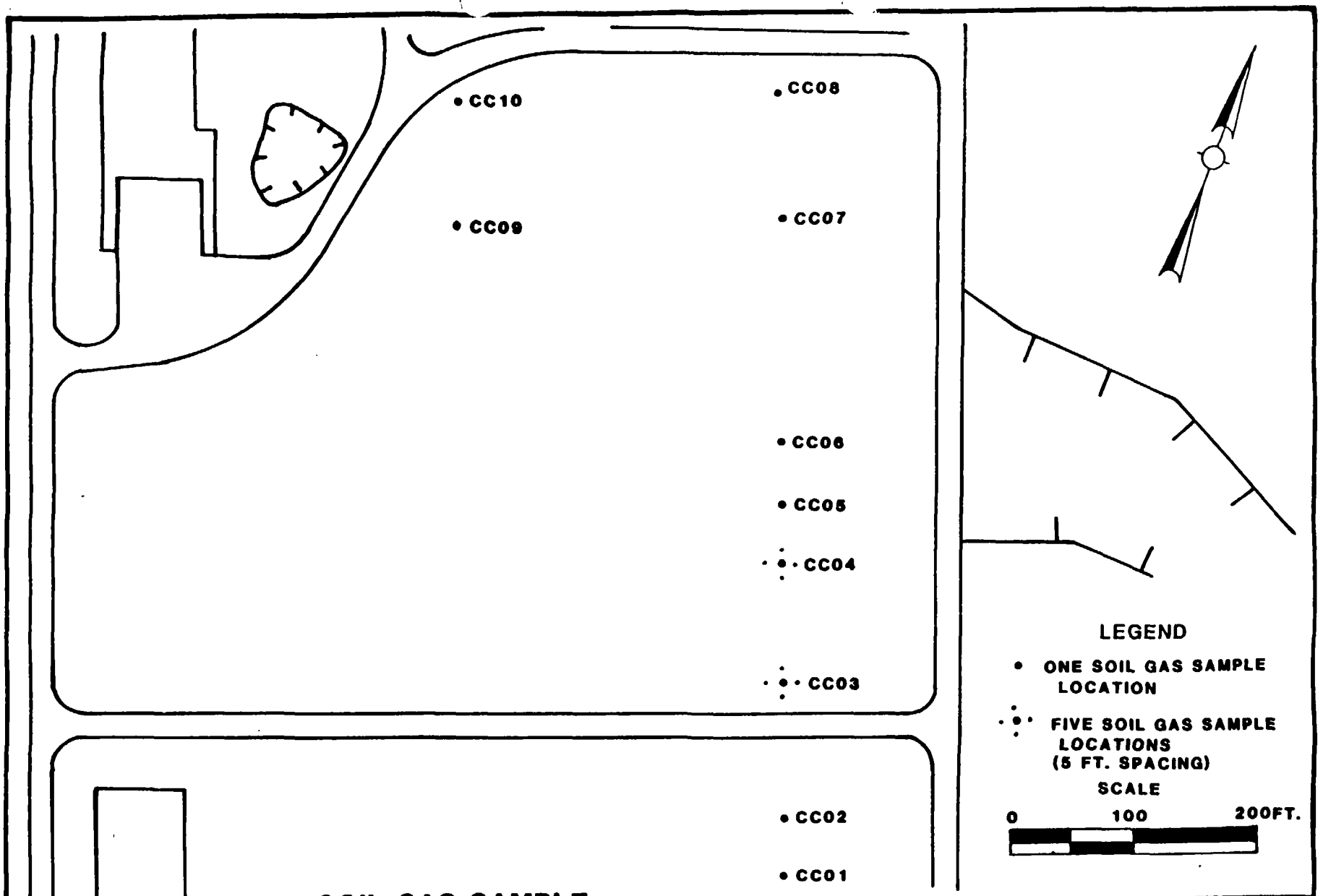
FIG. NO.
4.4-9

803200



SOIL GAS SAMPLE LOCATION MAP
AREA A2

503200



SOIL GAS SAMPLE LOCATION MAP-AREA C1

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Suite 1600
Chicago, Ill. 60606

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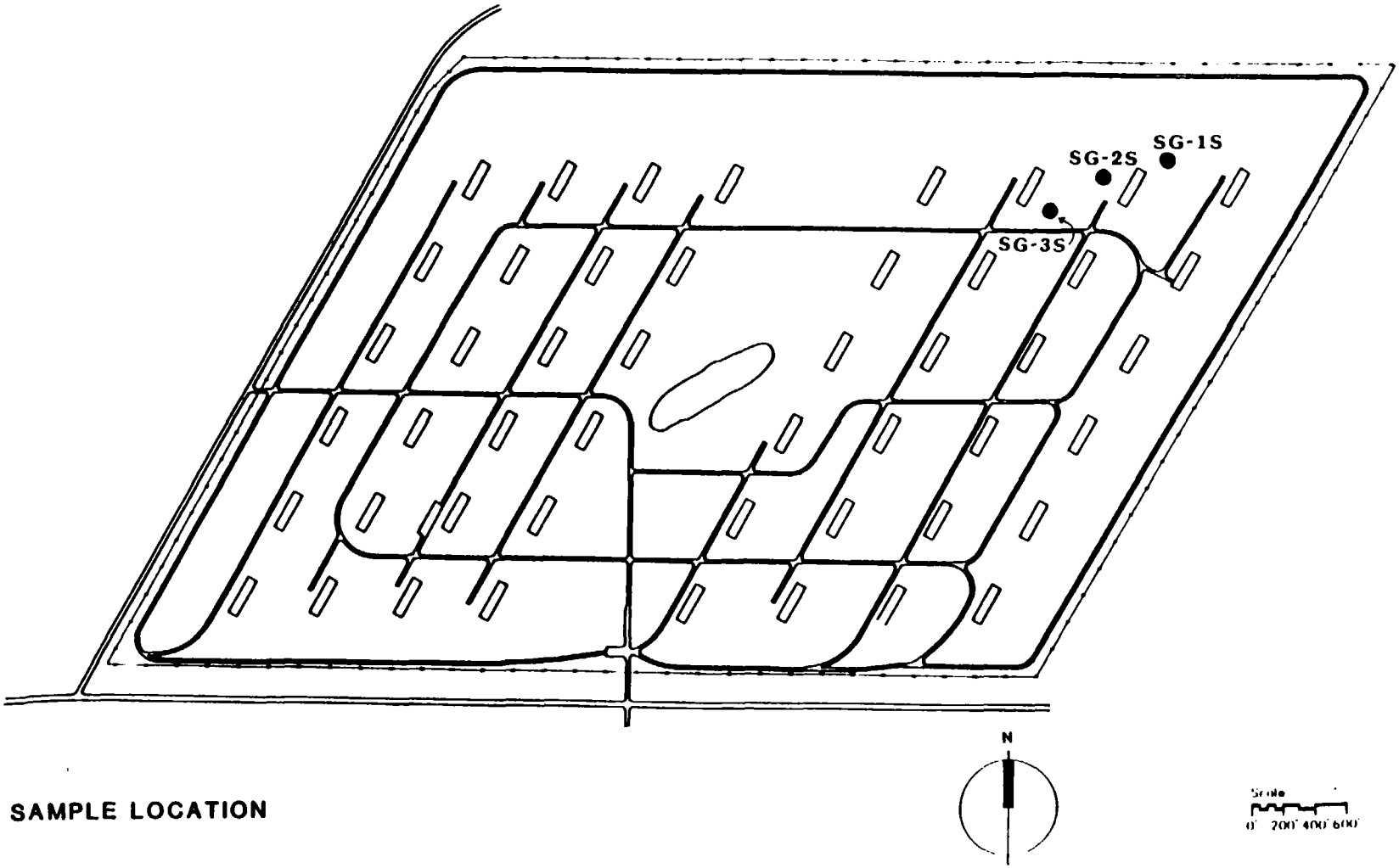
FIG. NO.
4.4-11

SD4178



● SAMPLE LOCATION

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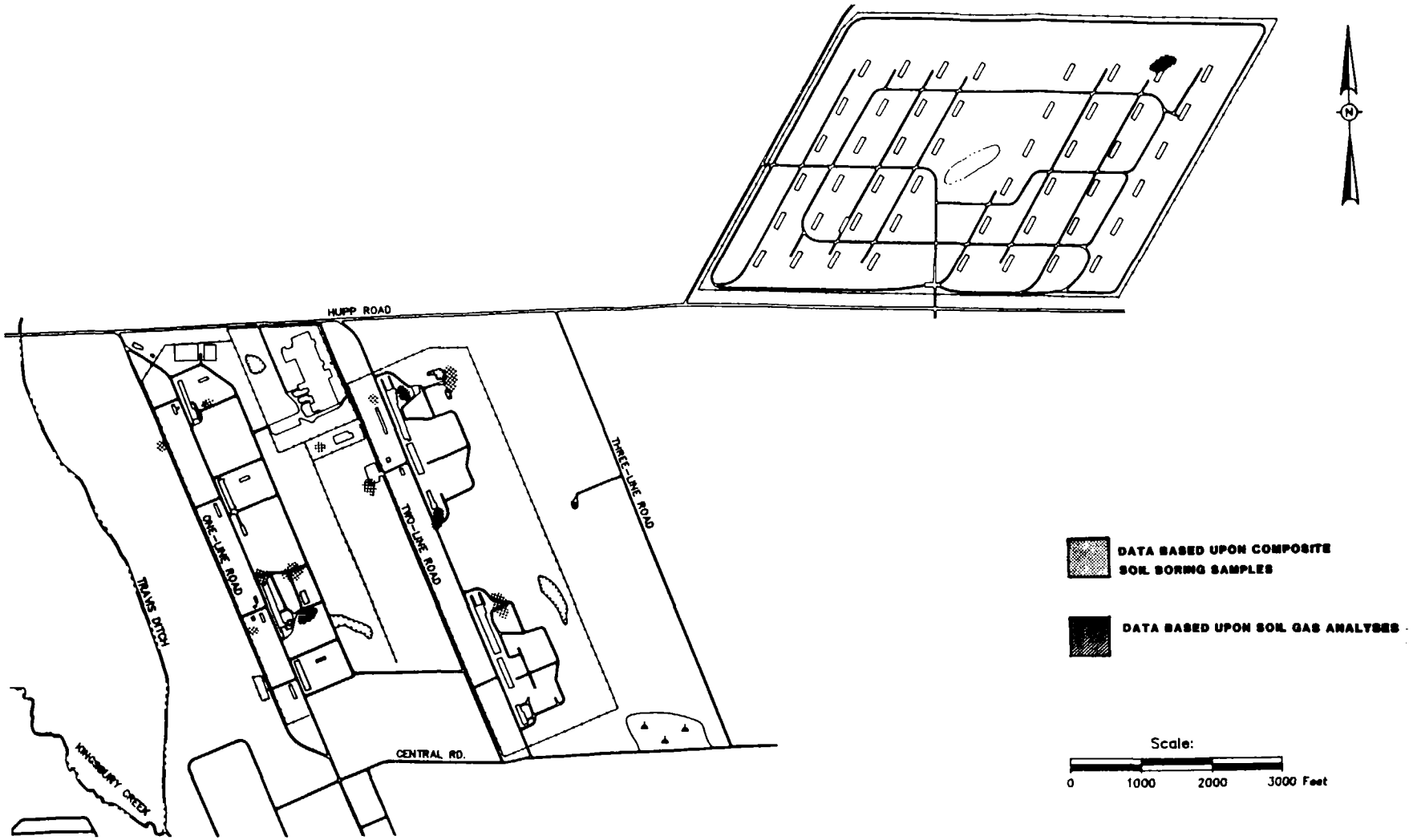

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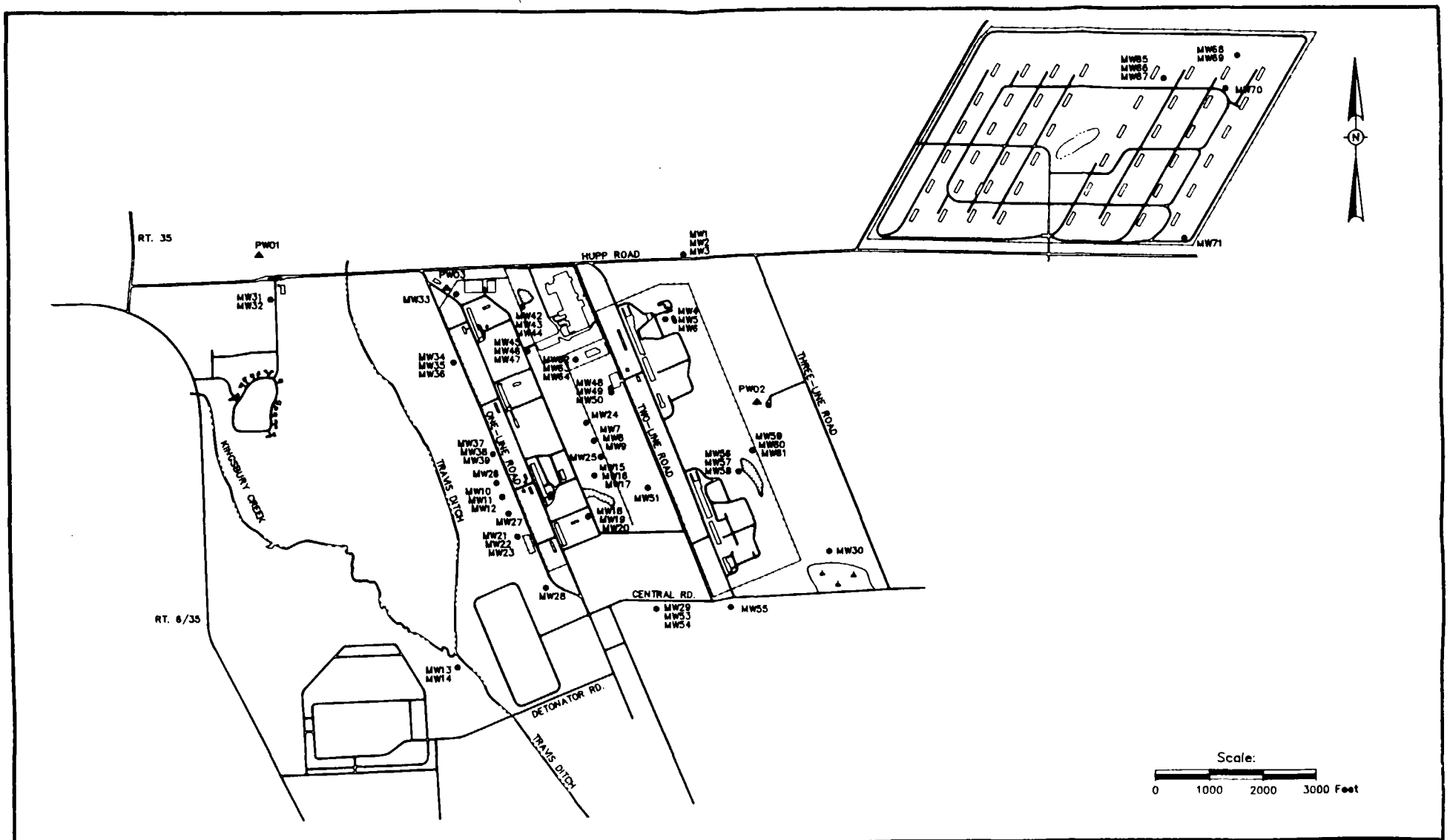
EXTENT OF CONTAMINATION IN THE UNSATURATED ZONE

FIGURE NO.
4.4-13

CAD FILE: DAN1



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MONITORING WELL LOCATION MAP

FIGURE NO.

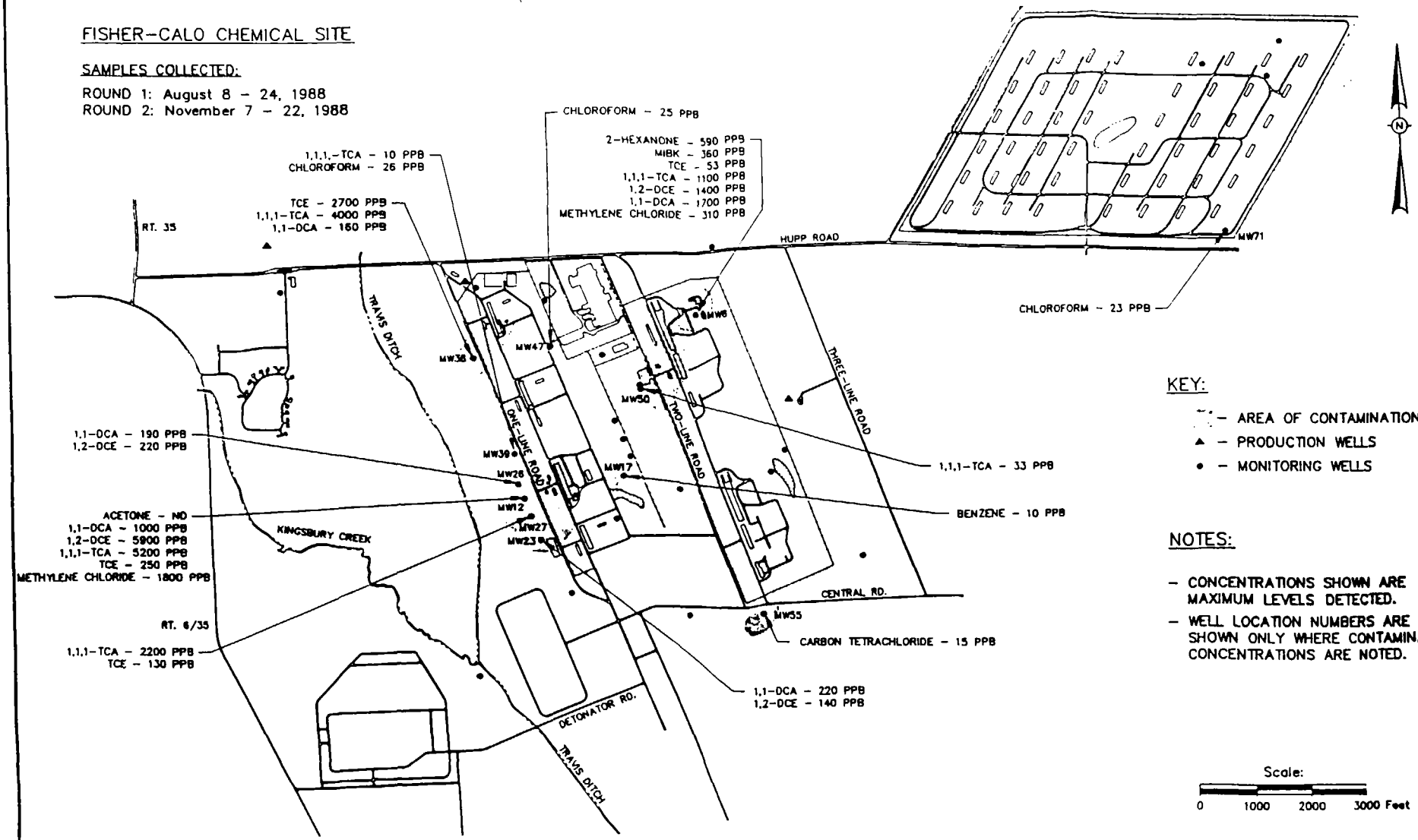
4.5-1

CAD FILE: JIL1

FISHER-CALO CHEMICAL SITE

SAMPLES COLLECTED:

ROUND 1: August 8 - 24, 1988
ROUND 2: November 7 - 22, 1988

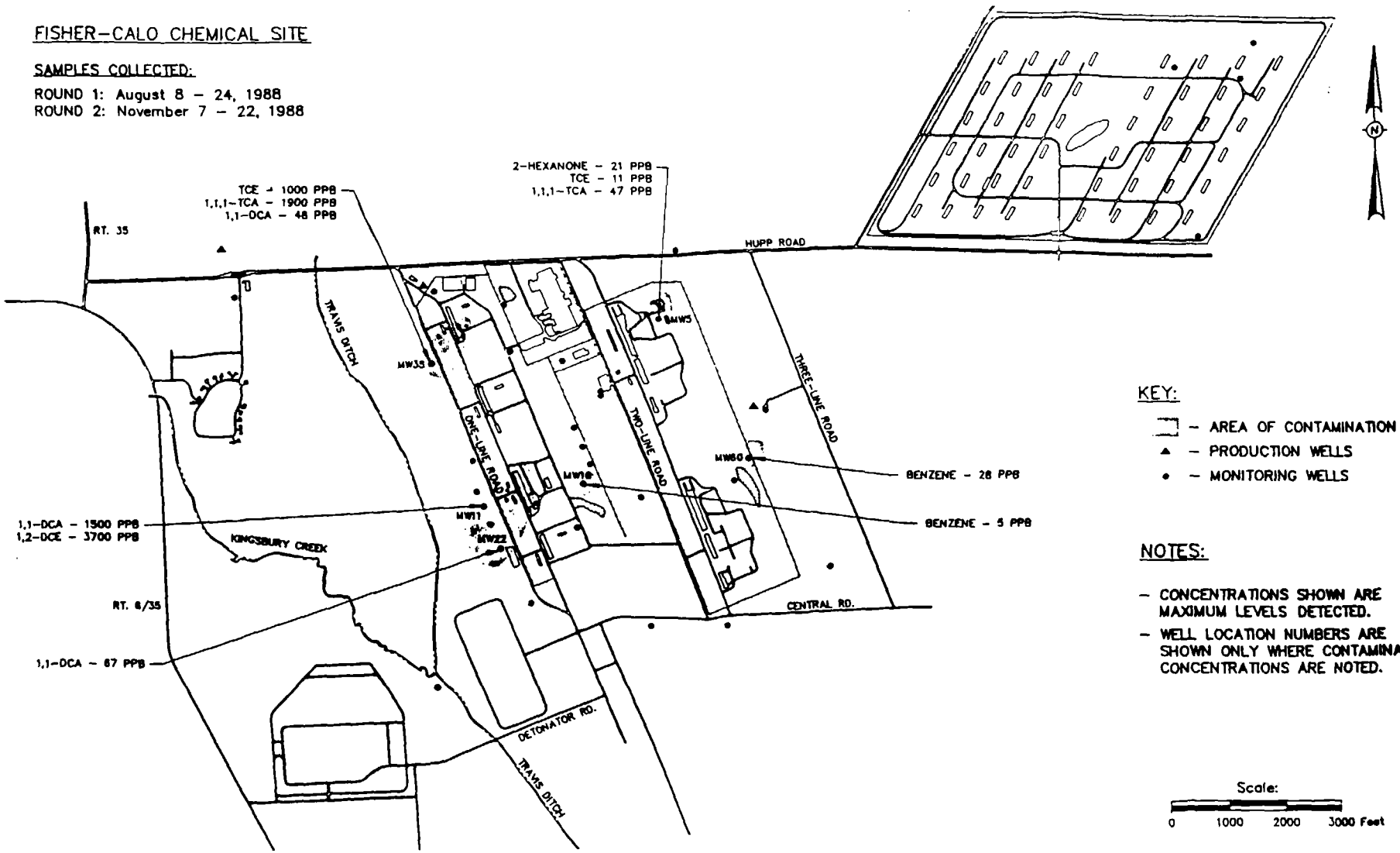


CDM *environmental engineers, scientists, planners, & management consultants*	MAXIMUM DETECTION LEVELS AND EXTENT OF CONTAMINATION FOUND IN ROUND 1 AND 2 GW SAMPLES	SHALLOW WELLS (Screen interval 25 to 40 ft.)	FIGURE NO. **4.5-2**

FISHER-CALO CHEMICAL SITE

SAMPLES COLLECTED:

ROUND 1: August 8 - 24, 1988
ROUND 2: November 7 - 22, 1988



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MAXIMUM DETECTION LEVELS AND EXTENT OF CONTAMINATION FOUND IN ROUND 1 AND 2 GW SAMPLES

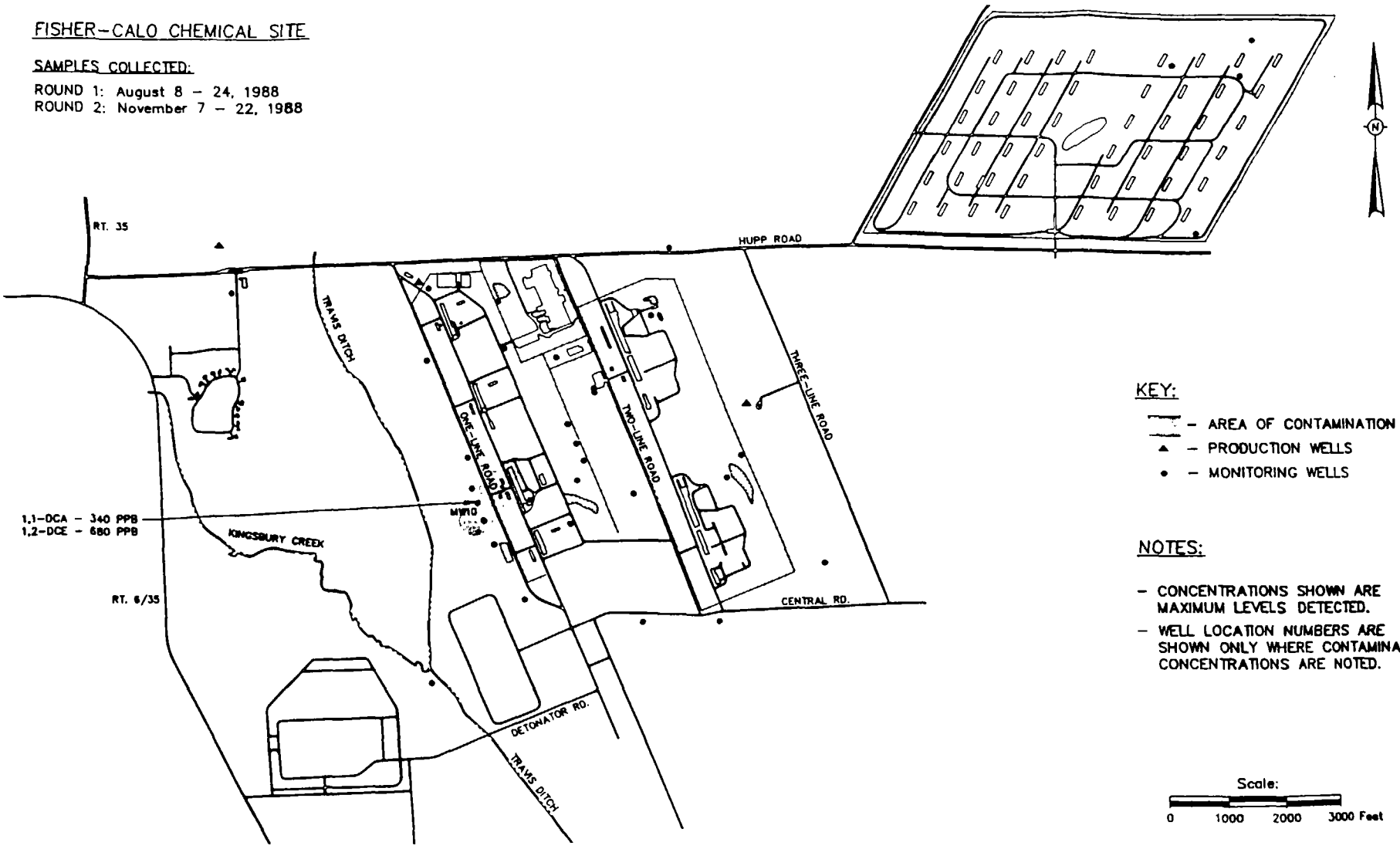
INTERMEDIATE WELLS
(Screen interval 40 to 60 ft.)

FIGURE NO.
4.5-3

FISHER-CALO CHEMICAL SITE

SAMPLES COLLECTED:

ROUND 1: August 8 - 24, 1988
ROUND 2: November 7 - 22, 1988

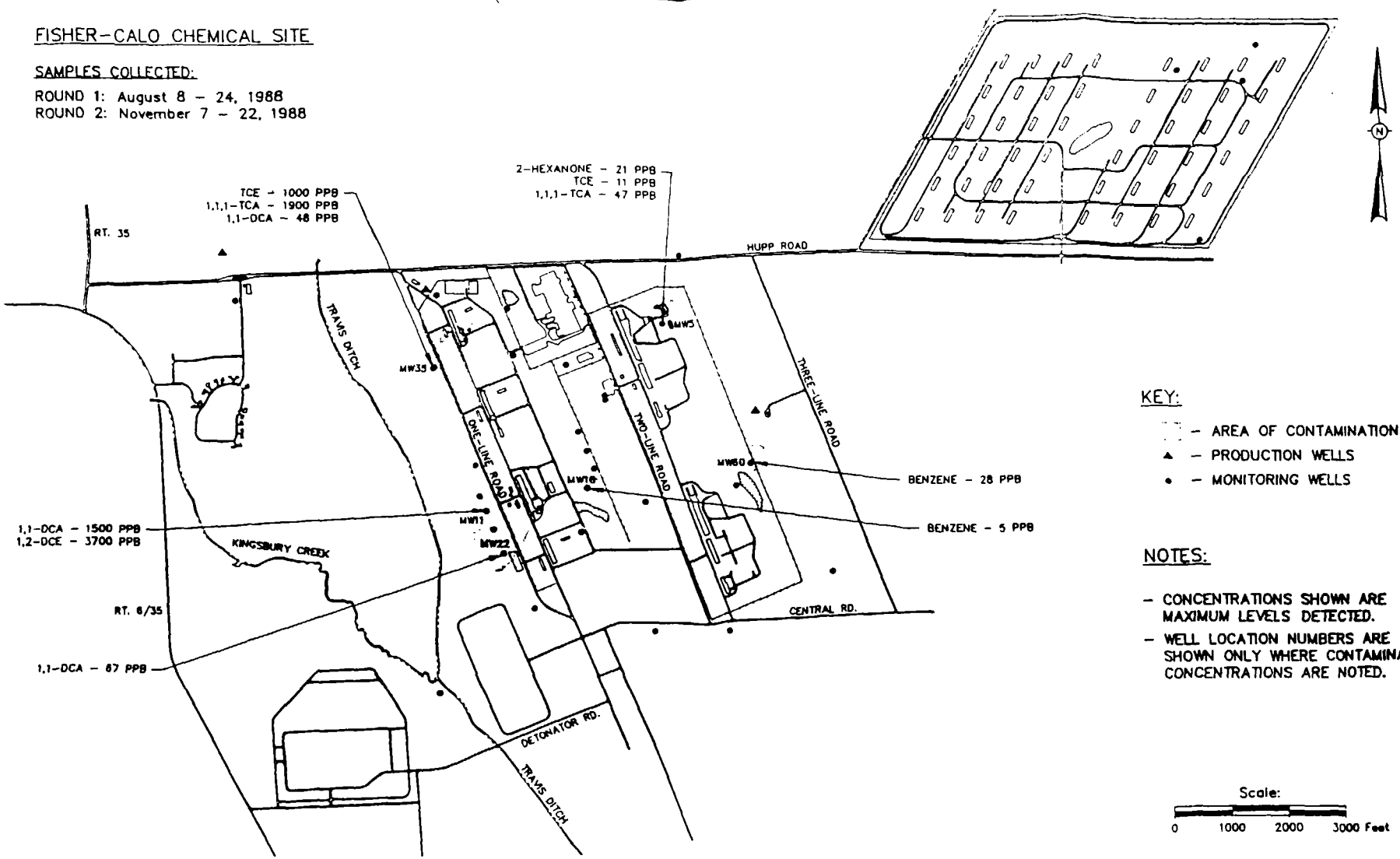


CDM *environmental engineers, scientists, planners, & management consultants*	MAXIMUM DETECTION LEVELS AND EXTENT OF CONTAMINATION FOUND IN ROUND 1 AND 2 GW SAMPLES	DEEP WELLS (Screen interval 60 - 80 ft.*) * MW-21 is screened at 105 ft.	FIGURE NO. **4.5-4**

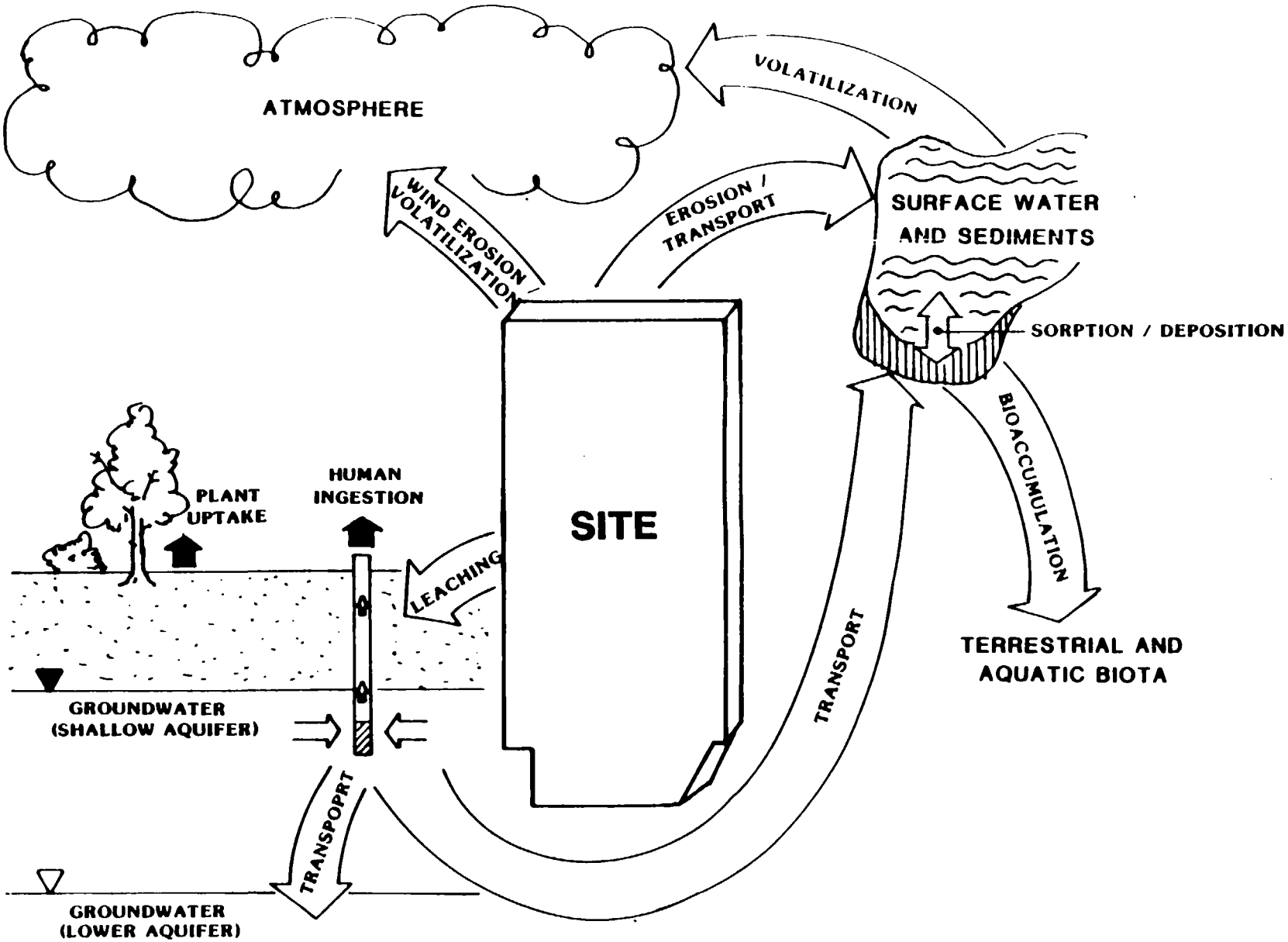
FISHER-CALO CHEMICAL SITE

SAMPLES COLLECTED:

ROUND 1: August 8 - 24, 1988
ROUND 2: November 7 - 22, 1988



CDM *environmental engineers, scientists, planners, & management consultants*	MAXIMUM DETECTION LEVELS AND EXTENT OF CONTAMINATION FOUND IN ROUND 1 AND 2 GW SAMPLES	INTERMEDIATE WELLS (Screen interval 40 to 60 ft.)	FIGURE NO **4.5-3**



CONTAMINANT MIGRATION PATHWAYS

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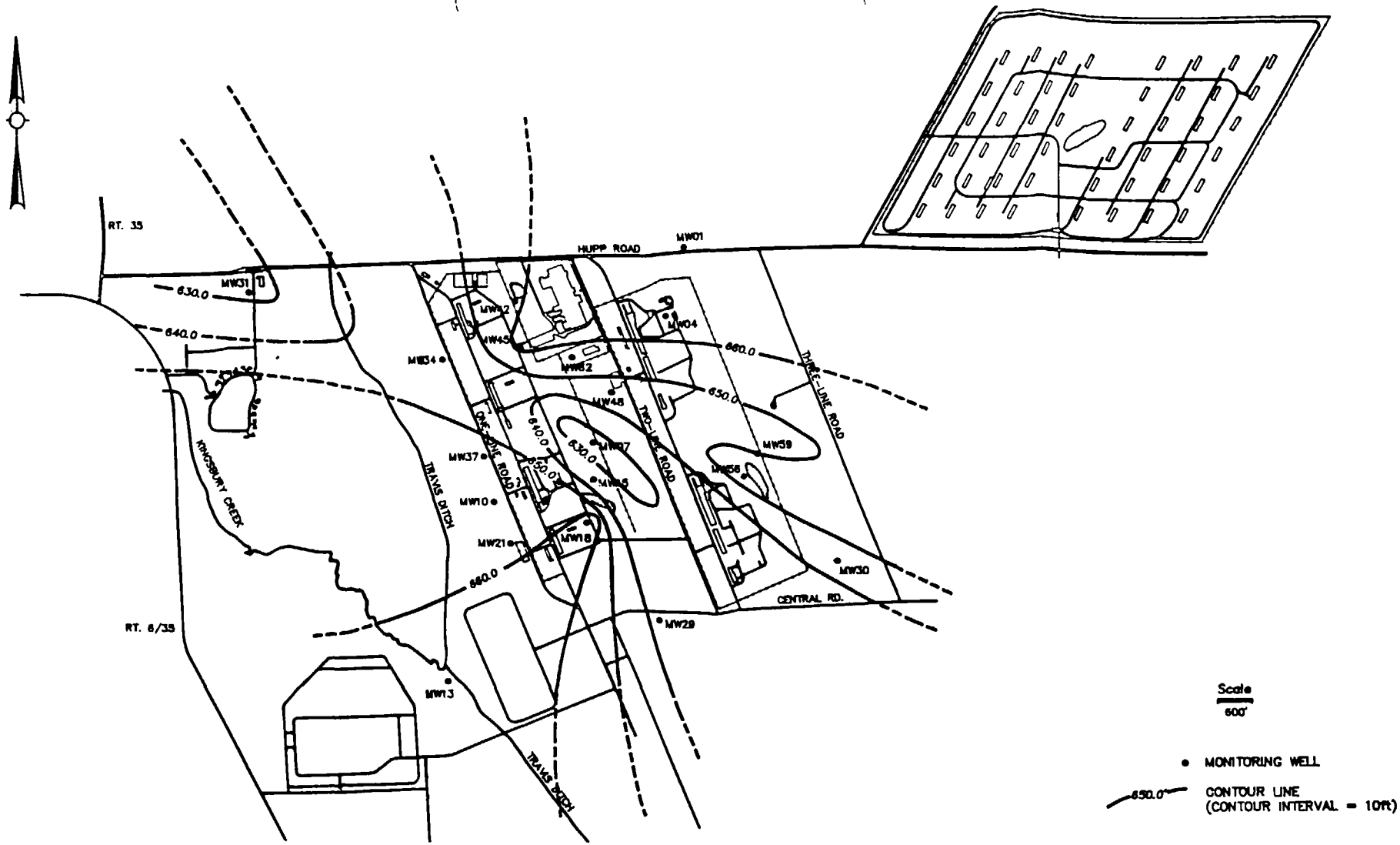
FIG. NO.
5.1-1



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STRUCTURE CONTOUR OF THE TOP OF THE SILTY CLAY LAYER

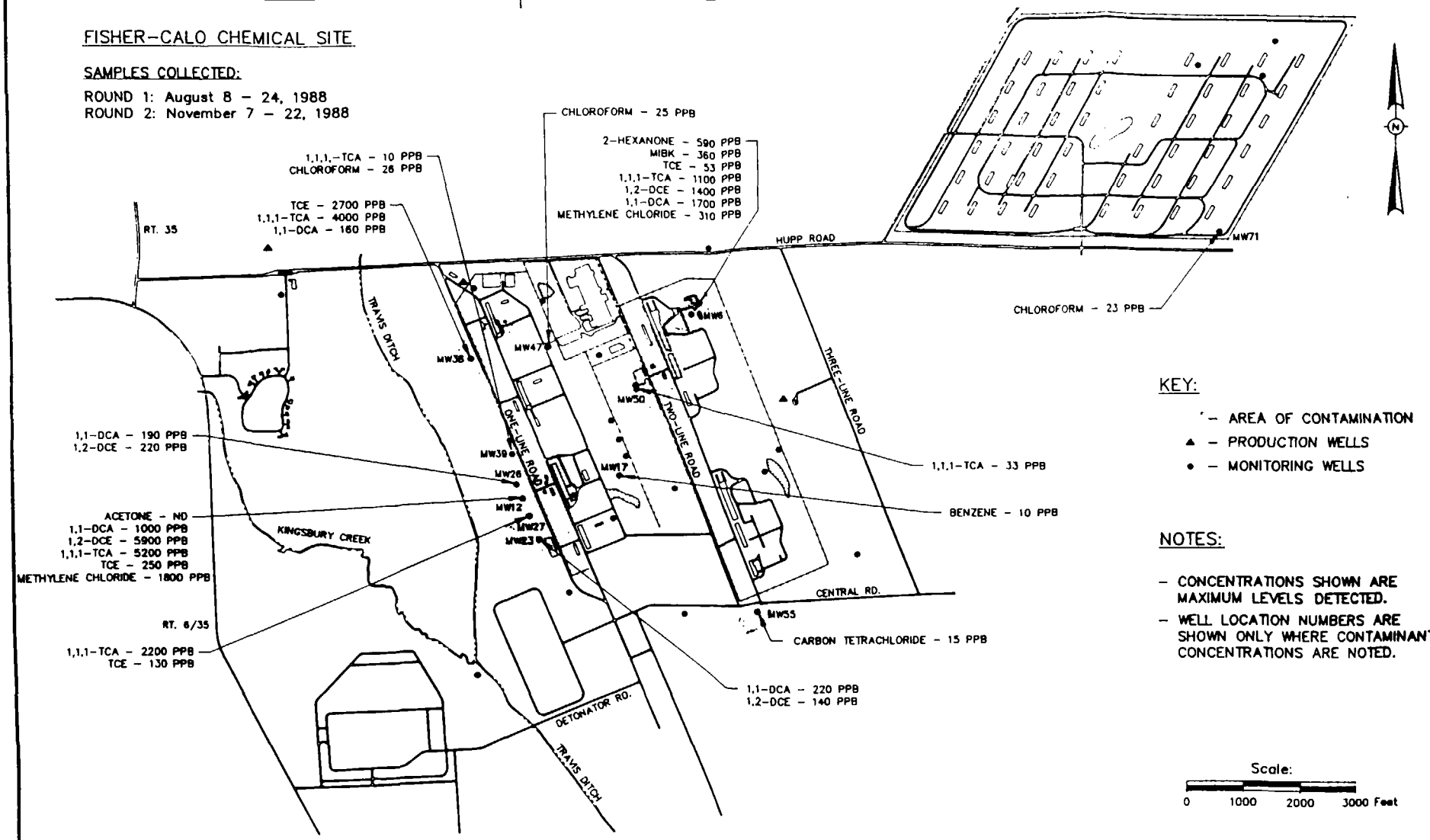
FIGURE NO.

5.2-2

FISHER-CALO CHEMICAL SITE

SAMPLES COLLECTED:

ROUND 1: August 8 – 24, 1988
ROUND 2: November 7 – 22, 1988



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MAXIMUM DETECTION LEVELS AND EXTENT OF CONTAMINATION FOUND IN ROUND 1 AND 2 GW SAMPLES

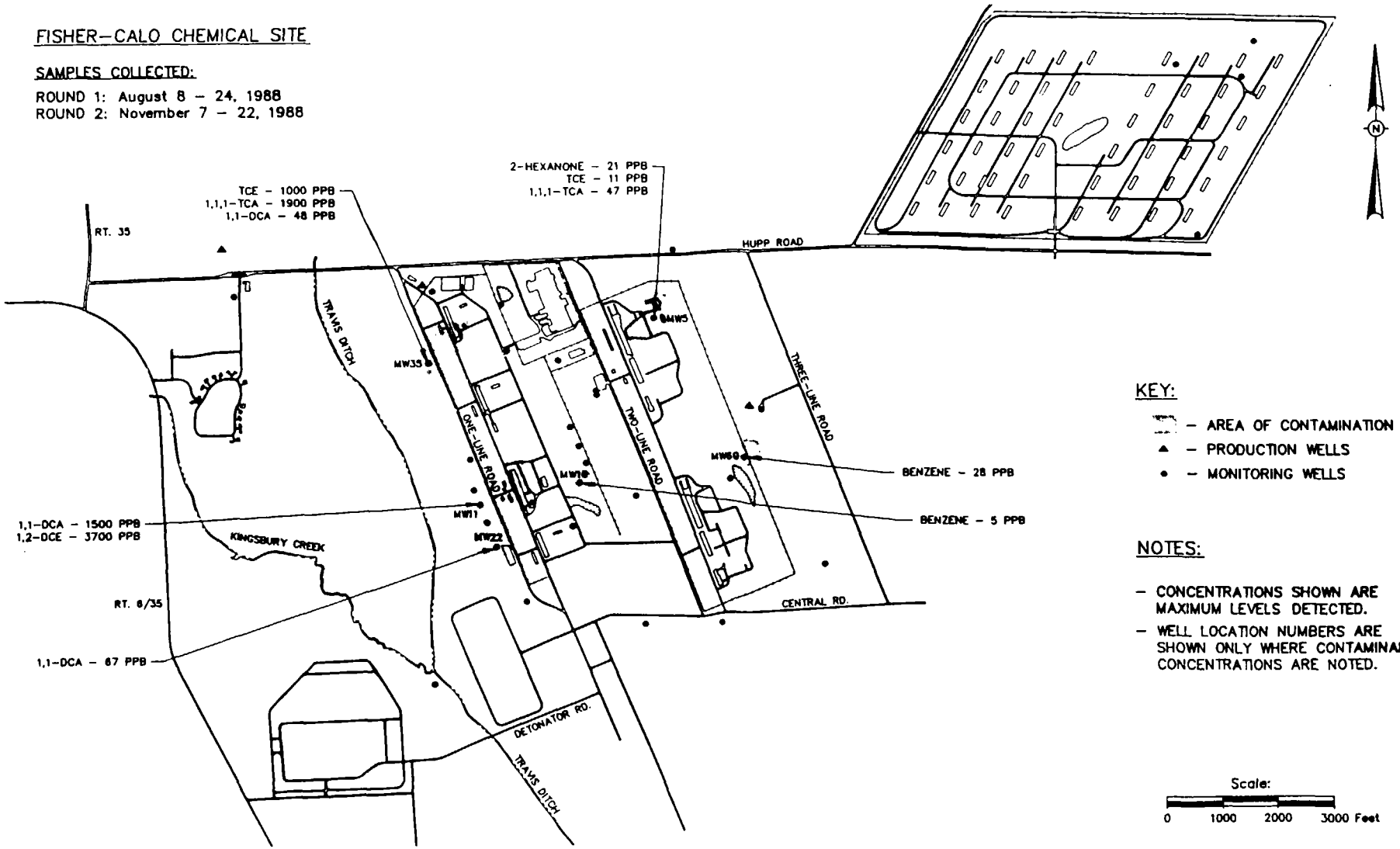
SHALLOW WELLS
(Screen interval 25 to 40 ft.)

FIGURE NO.
5.3-3

FISHER–CALO CHEMICAL SITE

SAMPLES COLLECTED:

ROUND 1: August 8 – 24, 1988
ROUND 2: November 7 – 22, 1988



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MAXIMUM DETECTION LEVELS AND EXTENT OF CONTAMINATION FOUND IN ROUND 1 AND 2 GW SAMPLES

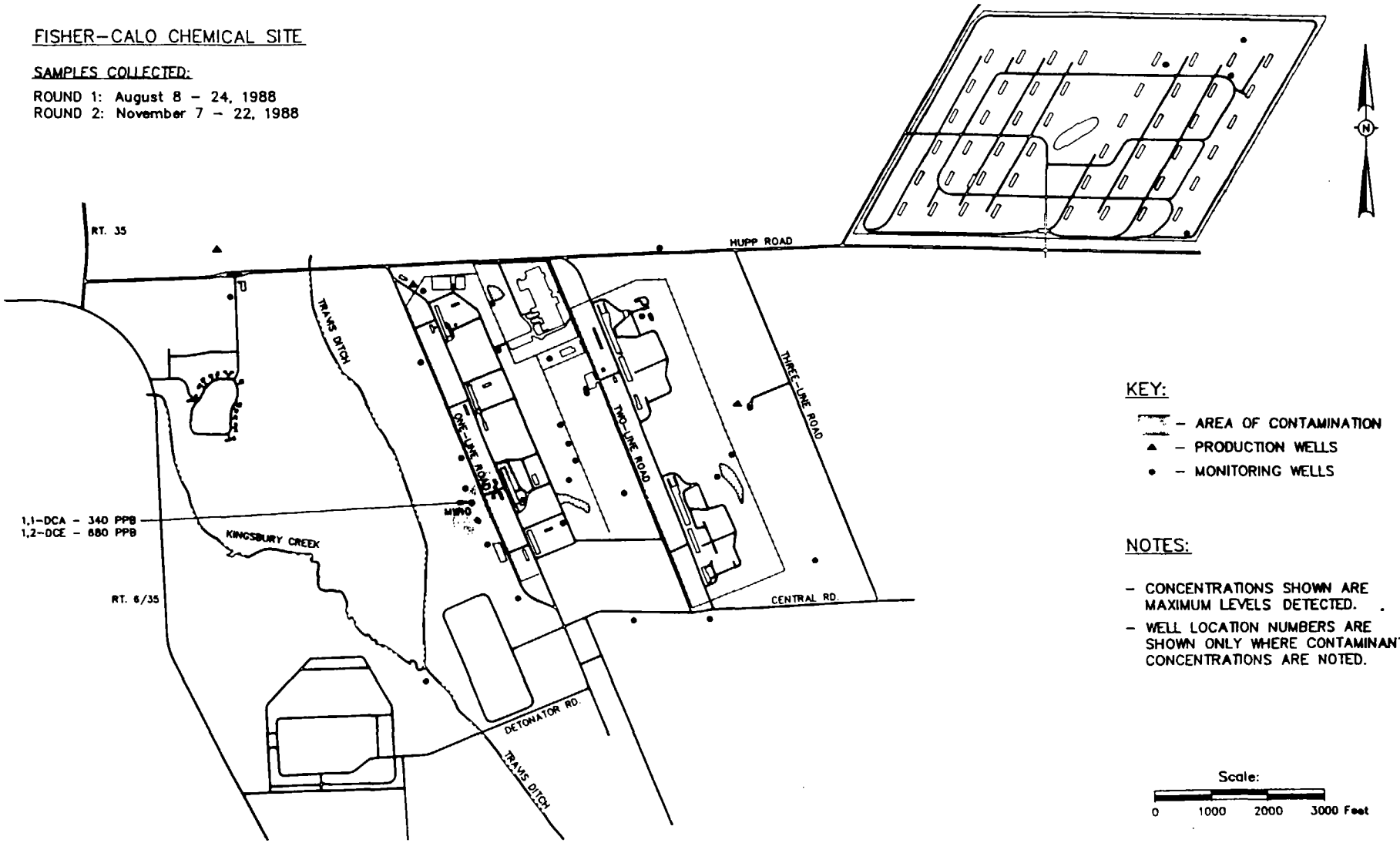
INTERMEDIATE WELLS
(Screen interval 40 to 60 ft.)

FIGURE NO.
5.3–4

FISHER-CALO CHEMICAL SITE

SAMPLES COLLECTED:

ROUND 1: August 8 - 24, 1988
ROUND 2: November 7 - 22, 1988



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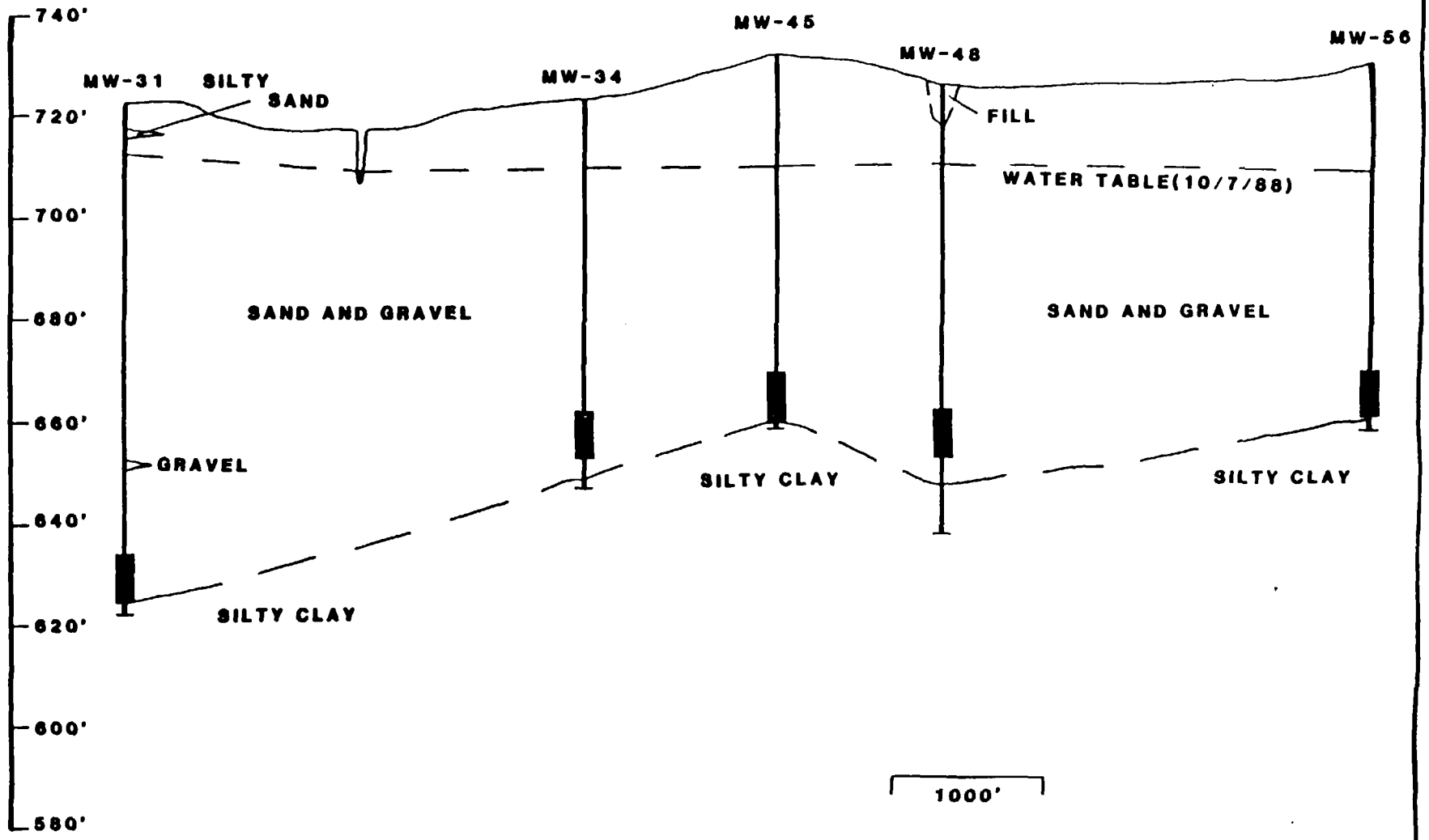
MAXIMUM DETECTION LEVELS AND EXTENT OF CONTAMINATION FOUND IN ROUND 1 AND 2 GW SAMPLES

DEEP WELLS
(Screen interval 60 - 80 ft.*)
* MW-21 is screened at 105 ft.

FIGURE NO.
5.3-5



SCREEN INTERVAL

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FIG. NO.
5.3-6

504176

APPENDIX B

B-1	Ambient Air Monitoring Results
B-2	Hydraulic Conductivity Results
B-3	Chemicals Detected at Fisher-Calo

APPENDIX B-1

AMBIENT AIR MONITORING RESULTS

AMBIENT AIR MONITORING RESULTS

SURVEY AREA:

A. (Background) outside KIDP office

HNu - <1 ppm

Detector Tubes - No color change noted on long duration or hand-pump.

MIRAN

NH_3	0.3 - 1.5 ppm
VCL	0.3 - 1.8 ppm
TCE	0.1 - 0.8 ppm
HCN	N.D.
MeCl	1.5 - 1.8 ppm

B. "Magnetic anamoly area" excavation and soil pile area.

HNu - <2 ppm

Detector Tubes - No color change noted on long duration or hand-pump.

MIRAN

NH_3	N.D.
VCL	N.D.
TCE	0.8 - 1.8 ppm
HCN	N.D.
MeCl	N.D.

C. Cardinal Chemical

C.1 Access road, approximately 1,000 feet southwest of Cardinal Chemical.

HNu - <1 ppm

Detector Tubes - No color change noted on long duration or hand pump.

MIRAN

NH_3	0.3 - 1.5 ppm
VCL	0.3 - 1.8 ppm
TCE	0 - 0.6 ppm
HCN	N.D.
MeCl	1.5 - 1.8 ppm

C. Cardinal Chemical (Cont.)

C.2 Service road, at western edge of discharge pond at Cardinal Chemical[1]

HNu - <1 ppm

Detector Tubes - No color change noted on hand-pump or long duration[2]

MIRAN

NH_3	N.D.
VCL	2.9 to 4.6 ppm
TCE	N.D.
HCN	N.D.
MeCl	N.D.

C.3 Utility pole approximately 250 feet east of Cardinal Chemical[1]

HNu - <1 ppm

Detector Tubes - No color change noted on hand-pump or long duration[2]

MIRAN

NH_3	N.D.
VCL	8.3 to 28 ppm
TCE	N.D.
HCN	N.D.
MeCl	N.D.

C.4 Impoundment at north end of Cardinal Chemical[1]

HNu - <1 ppm

Detector Tubes - No color change noted on hand-pump (only).

MIRAN

NH_3	N.D.
VCL	3.2 to 5.8 ppm
TCE	N.D.
HCN	N.D.
MeCl	N.D.

AMBIENT AIR MONITORING RESULTS (Cont.)

D. Depression area, southeast of Cardinal Chemical

HNu - <2 ppm

Detector Tubes - Long Duration - No color change detected.

Hand-Pump - TCE - <2 ppm

- PCE - 10 ppm

MIRAN

NH_3	N.D.
VCL	N.D.
TCE	0.8 - 1.8 PPM
HCN	N.D.
MeCl	N.D.

(1) Strong "ammonia" odor noted - survey conducted in modified Level C.

(2) Long duration NH_3 Detector tube - color "faded," possible interference.

APPENDIX B-2

HYDRAULIC CONDUCTIVITY

HYDRAULIC CONDUCTIVITY

WELL #	DEPTH OF SCREEN INTERVAL (ft)	FALLING HEAD TEST (ft/day)	RISING HEAD TEST (ft/day)	AVERAGE HYDRAULIC CONDUCTIVITY (ft/day)	AVERAGE HYDRAULIC CONDUCTIVITY (cm/sec)
MW-01	60.0-70.0	16.77	-	16.77	5.92×10^{-3}
MW-02	40.0-50.0	18.47	-	18.47	6.51×10^{-3}
MW-03	22.6-27.6	52.91	52.91	52.91	1.87×10^{-2}
MW-04	65.0-75.0	6.76	4.71	5.73	2.02×10^{-3}
MW-05	44.0-54.0	235.57*	-	-	-
MW-06	25.0-35.0	121.78	143.70	132.74	4.69×10^{-2}
MW-07	83.0-93.0	2.80	2.44	2.62	9.25×10^{-4}
MW-08	40.0-50.0	-	119.75*	-	-
MW-09	18.0-23.0	-	154.40	154.40	5.45×10^{-2}
MW-10	57.5-67.5	-	100.49	-	-
MW-11	40.0-50.0	-	-	-	-
MW-12	27.5-32.5	45.05	-	45.05	1.59×10^{-2}
MW-13	80.0-90.0	13.10	13.10	13.10	4.62×10^{-3}
MW-14	32.0-42.0	199.58*	-	-	-
MW-15	81.0-91.0	4.95	4.59	4.77	1.68×10^{-3}
MW-16	40.0-50.0	78.96	84.04	81.50	2.88×10^{-2}
MW-17	29.0-39.0	44.31	49.80	47.05	1.66×10^{-2}
MW-18	73.0-78.0	11.95[1]	9.75	10.85	3.83×10^{-3}
MW-19	40.0-50.0	171.00*	-	-	-
MW-20	20.0-25.0	-	161.51	161.51	5.70×10^{-2}

20913/11.1

HYDRAULIC CONDUCTIVITY

WELL #	DEPTH OF SCREEN INTERVAL (ft)	FALLING HEAD TEST (ft/day)	RISING HEAD TEST (ft/day)	AVERAGE HYDRAULIC CONDUCTIVITY (ft/day)	AVERAGE HYDRAULIC CONDUCTIVITY (cm/sec)
MW-21	111.5-121.5	13.69	10.05	11.87	4.19×10^{-3}
MW-22	63.0-73.0	22.99	26.81	24.90	8.79×10^{-3}
MW-23	27.0-37.0	54.64	56.46[1]	55.55	1.96×10^{-2}
MW-24	28.3-33.3	127.86	164.76	146.31	5.16×10^{-2}
MW-25	23.0-28.0	98.20	127.86	113.03	3.99×10^{-2}
MW-26	31.0-36.0	-	134.89	134.89	4.76×10^{-2}
MW-27	33.0-38.0	183.21	217.56	200.38	7.07×10^{-2}
MW-28	29.0-34.0	-	100.20	100.20	3.54×10^{-2}
MW-29	76.0-86.0	2.36	-	2.36	8.33×10^{-4}
MW-30	61.0-71.0	5.23	4.02	4.62	1.63×10^{-3}
MW-31	98.0-88.0	9.36	7.32	8.34	2.94×10^{-3}
MW-32	38.0-48.0	-	-	-	-
MW-33	23.0-33.0	196.85*	-	-	-
MW-34	61.7-71.7	118.76	186.62	152.69	5.39×10^{-2}
MW-35	40.0-50.0	-	-	-	-
MW-36	18.0-28.0	134.30	154.52	144.41	5.10×10^{-2}
MW-37	64.7-74.7	5.15	5.47	5.31	1.87×10^{-3}
MW-38	45.5-55.5	143.70	-	143.70	5.07×10^{-2}
MW-39	25.0-35.0	-	-	-	-
MW-42	70.0-80.0	23.52	23.33	21.25	7.50×10^{-3}

HYDRAULIC CONDUCTIVITY

WELL #	DEPTH OF SCREEN INTERVAL (ft)	FALLING HEAD TEST (ft/day)	RISING HEAD TEST (ft/day)	AVERAGE HYDRAULIC CONDUCTIVITY (ft/day)	AVERAGE HYDRAULIC CONDUCTIVITY (cm/sec)
MW-43	43.0-53.0	149.70*	98.42*	-	-
MW-44	25.0-35.0	83.06*	102.64[2]	102.64	3.62×10^{-2}
MW-45	62.0-72.0	1.52	1.59	1.56	5.51×10^{-4}
MW-46	43.0-53.0	-	-	-	-
MW-47	23.0-33.0	69.47	87.62	78.52	2.77×10^{-2}
MW-48	76.0-86.0	0.65	0.69	0.67	2.36×10^{-4}
MW-49	43.0-53.0	-	-	-	-
MW-50	17.8-27.8	80.73	85.03	82.88	2.92×10^{-2}
MW-51	22.0-32.0	145.20	143.70	144.45	2.09×10^{-4}
MW-53	42.0-52.0	-	-	-	-
MW-54	22.6-32.6	105.70	113.10	109.40	1.20×10^{-4}
MW-55	22.6-32.6	-	-	-	-
MW-56	60.0-70.0	65.60	44.80	55.20	1.95×10^{-2}
MW-57	47.0-57.0	-	-	-	-
MW-58	22.0-32.0	-	-	-	-
MW-59	69.2-79.2	11.17	10.45	10.81	3.82×10^{-3}
MW-60	48.0-58.0	194.20*	186.60*	-	-
MW-61	21.5-31.5	171.10*	165.20*	-	-
MW-62	64.0-74.0	5.01	4.97	4.99	1.76×10^{-3}
MW-63	48.0-58.0	-	-	-	-

20913/11.3

HYDRAULIC CONDUCTIVITY

WELL #	DEPTH OF SCREEN INTERVAL (ft)	FALLING HEAD TEST (ft/day)	RISING HEAD TEST (ft/day)	AVERAGE HYDRAULIC CONDUCTIVITY (ft/day)	AVERAGE HYDRAULIC CONDUCTIVITY (cm/sec)
MW-64	23.0-33.0	196.80*	186.60*	-	-
MW-65	60.0-70.0	3.56	3.65	3.60	1.27×10^{-3}
MW-66	39.7-49.7	334.20*	146.60*	-	-
MW-67	22.0-32.0	131.80	-	131.81	4.65×10^{-2}
MW-68	46.0-56.0	14.90	14.90	14.90	5.26×10^{-3}
MW-69	13.0-23.0	14.80	14.50	14.65	5.17×10^{-3}
MW-70	18.0-28.0	368.50*	217.70*	-	-
MW-71	23.0-33.0	69.40	80.30	74.85	5.60×10^{-3}

Average Hydraulic Conductivity = 63.29 ft/day (2.23×10^{-2} cm/sec).

[1] Average of two tests.

[2] Actual value, not averaged with estimated value.

* Estimated value. Values not included in average hydraulic conductivity.

- No test or results obtainable.

20913/11.4

APPENDIX B-3

CHEMICALS DETECTED AT THE FISHER-CALO SITE

CHEMICALS DETECTED AT THE FISHER-CALO SITE

AREA A

COMPOUNDS	GROUND-WATER	SUBSUR-FACE SOIL	SURFACE SOIL
VOLATILE ORGANICS			
1,1,1-TRICHLOROETHANE	X	X	X
1,1,2-TRICHLOROETHANE		X	
1,1-DICHLOROETHANE	X	X	
1,2-DICHLOROETHENE		X	
2-BUTANONE		X	X
2-HEXANONE	X		
4-METHYL-2-PENTANONE	X	X	X
ACETONE		X	X
CARBON DISULFIDE			X
CHLOROFORM		X	X
CIS-1,3-DICHLOROPROPENE		X	
ETHYLBENZENE		X	X
METHYLENE CHLORIDE	X	X	X
TETRACHLOROETHENE		X	X
TOLUENE		X	X
TRANS-1,2-DICHLOROETHENE	X	X	X
TRICHLOROETHENE	X	X	
VINYL ACETATE			X
XYLENES		X	X
SEMIVOLATILE ORGANICS			
1,2-DICHLOROBENZENE		X	
2,4,6-TRICHLOROPHENOL			X
2,4-DIMETHYLPHENOL			X
2,6-DINITROTOLUENE		X	
2-METHYLNAPHTHALENE		X	X
2-NITROPHENOL	X		
4-BROMOPHENYLPHENYLETHER			X
4-CHLORO-3-METHYLPHENOL		X	
4-METHYLPHENOL			X
ACENAPHTHALENE		X	
ACENAPHTHENE		X	
ANTHRACENE		X	
BENZOIC ACID		X	
BENZO(A)ANTHRACENE		X	X
BENZO(A)PYRENE		X	X
BENZO(B)FLUORANTHENE			X
BENZO(G,H,I)PERYLENE		X	X

CHEMICALS DETECTED AT THE FISHER-CALO SITE

AREA A

COMPOUNDS	GROUND-WATER	SUBSUR-FACE SOIL	SURFACE SOIL
SEMIVOLATILE ORGANICS			
BENZO(K)FLUORANTHENE			X
BIS(2-CHLOROISOPROPYL)ETHER			X
BIS(2-ETHYLHEXYL)PHTHALATE		X	X
BUTYL BENZYL PHTHALATE		X	X
CHRYSENE		X	X
DIBENZOFURAN		X	
DIMETHYL PHTHALATE		X	
DI-N-BUTYLPHTHALATE		X	X
DI-N-OCTYL PHTHALATE		X	X
FLOUORENE		X	
FLUORANTHENE		X	X
IDENO(1,2,3-CD)PYRENE			X
ISOPHORONE	X	X	X
NAPHTHALENE		X	X
N-NITROSODIPHENYLAMINE			X
N-NITROSO-DIPROPYLAMINE		X	
PENTACHLOROPHENOL			X
PHENANTHRENE		X	X
PHENOL		X	X
PYRENE		X	X
PESTICIDES/PCBs			
AROCLOR-1254			X
AROCLOR-1260			X
BETA-BHC		X	
INORGANICS			
ALUMINUM	X	X	X
ANTIMONY	X	X	X
ARSENIC	X	X	X
BARIUM	X	X	X
BERYLLIUM	X	X	X
CALCIUM	X	X	X
CHROMIUM	X	X	X
COBALT	X	X	X
COPPER	X	X	X
CYANIDE		X	X
IRON	X	X	X
LEAD	X	X	X

CHEMICALS DETECTED AT THE FISHER-CALO SITE

AREA A

COMPOUNDS	GROUND-WATER	SUBSUR-FACE SOIL	SURFACE SOIL
INORGANICS			
MAGNESIUM	X	X	X
MANGANESE	X	X	X
MERCURY	X	X	X
NICKEL	X	X	X
POTASSIUM	X	X	X
SODIUM	X	X	X
VANADIUM		X	X
ZINC	X	X	X

CHEMICALS DETECTED AT THE FISHER-CALO SITE

AREA B

COMPOUNDS	GROUND-WATER	SUBSUR-FACE SOIL	SURFACE SOIL
VOLATILE ORGANICS			
1,1,1-TRICHLOROETHANE		X	X
2-BUTANONE		X	
4-METHYL-2-PENTANONE		X	
ACETONE		X	
BENZENE	X		X
CARBON DISULFIDE			X
CARBON TETRACHLORIDE	X		
CHLOROBENZENE			X
CHLOROFORM		X	
ETHYLBENZENE		X	X
METHYLENE CHLORIDE		X	X
TETRACHLOROETHENE		X	X
TOLUENE		X	X
TRICHLOROETHENE		X	
VINYL ACETATE		X	
XYLENES		X	X
SEMIVOLATILE ORGANICS			
1,2,4-TRICHLOROBENZENE			X
1,2-DICHLOROBENZENE			X
1,3-DICHLOROBENZENE			X
1,4-DICHLOROBENZENE			X
2-CHLOROPHENOL			X
2-METHYLNAPHTHALENE		X	X
4-CHLORO-3-METHYLPHENOL			X
4-NITROPHENOL			X
ACENAPHTHALENE			X
ACENAPHTHENE			X
ANTHRACENE			X
BENZOIC ACID			X
BENZO(A)ANTHRACENE			X
BENZO(A)PYRENE			X
BENZO(B)FLUORANTHENE			X
BENZO(G,H,I)PERYLENE			X
BENZO(K)FLUORANTHENE			X
BIS(2-ETHYLHEXYL)PHTHALATE		X	X
CHRYSENE			X
DIBENZO(A,H)ANTHRACENE			X
DIETHYLPHTHALATE			X
DIMETHYLPHTHALATE			X

CHEMICALS DETECTED AT THE FISHER-CALO SITE

AREA B

COMPOUNDS	GROUND-WATER	SUBSUR-FACE SOIL	SURFACE SOIL
SEMIVOLATILE ORGANICS			
DI-N-BUTYLPHTHALATE		X	X
FLUORANTHENE			X
IDENO(1,2,3-CD)PYRENE			X
ISOPHORONE		X	X
NAPHTHALENE		X	
PHENANTHRENE			X
PHENOL			X
PYRENE			X
PESTICIDES/PCBs			
4,4-DDT			X
AROCLOR-1260		X	X
INORGANICS			
ALUMINUM	X	X	X
ANTIMONY	X	X	X
ARSENIC	X	X	X
BARIUM	X	X	X
BERYLLIUM	X	X	X
CALCIUM	X	X	X
CHROMIUM	X	X	X
COBALT	X	X	X
COPPER	X	X	X
CYANIDE		X	X
IRON	X	X	X
LEAD	X	X	X
MAGNESIUM	X	X	X
MANGANESE	X	X	X
MERCURY	X	X	X
NICKEL	X	X	X
POTASSIUM	X	X	X
SODIUM	X	X	X
VANADIUM	X	X	X
ZINC	X	X	X

CHEMICALS DETECTED AT THE FISHER-CALO SITE

AREA C

COMPOUNDS	GROUND-WATER	SURFACE WATER	SEDIMENT	SUBSUR-FACE SOIL	SURFACE SOIL
VOLATILE ORGANICS					
1,1,1-TRICHLOROETHANE	X			X	X
1,1,2,2-TETRACHLOROETHANE				X	
1,1-DICHLOROETHANE	X			X	
1,2-DICHLOROETHENE				X	
2-BUTANONE				X	X
2-HEXANONE				X	
4-METHYL-2-PENTANONE				X	X
ACETONE	X			X	X
BENZENE	X				
BROMODICHLOROMETHANE					X
CARBON DISULFIDE					X
CARBON TETRACHLORIDE		X	X		X
CHLOROFORM	X	X	X	X	X
ETHYLBENZENE				X	
METHYLENE CHLORIDE	X	X		X	X
STYRENE			X	X	X
TETRACHLOROETHENE			X	X	X
TOLUENE				X	X
TRANS-1,2-DICHLOROETHENE	X			X	
TRICHLOROETHENE	X	X		X	
VINYL ACETATE				X	
XYLENES				X	X
SEMIVOLATILE ORGANICS					
1,2,4-TRICHLOROBENZENE					X
1,4-DICHLOROBENZENE					X
2,4,6-TRICHLOROPHENOL	X				X
2,4-DIMETHYLPHENOL	X			X	X
2,4-DINITROPHENOL				X	
2-CHLOROPHENOL					X
2-METHYLNAPHTHALENE			X	X	X
2-METHYLPHENOL				X	X
3,3-DICHLOROBENZIDENE				X	
4,6-DINITRO-2-METHYLPHENOL				X	
4-CHLORO-3-METHYLPHENOL					X
4-METHYLPHENOL					X
4-NITROPHENOL					X
ACENAPHTHALENE					X

CHEMICALS DETECTED AT THE FISHER-CALO SITE

AREA C

COMPOUNDS	GROUND-WATER	SURFACE WATER	SEDIMENT	SUBSUR-FACE SOIL	SURFACE SOIL
SEMIVOLATILE ORGANICS					
ACENAPHTHENE					X
ANTHRACENE					X
BENZOIC ACID					X
BENZO(A)ANTHRACENE			X		X
BENZO(A)PYRENE			X	X	X
BENZO(B)FLUORANTHENE			X		X
BENZO(G,H,I)PERYLENE			X		X
BENZO(K)FLUORANTHENE			X		X
BENZYL ALCOHOL					X
BIS(2-CHLOROISOPROPYL)ETHER					X
BIS(2-ETHYLHEXYL)PHTHALATE			X	X	X
BUTYL BENZYL PHTHALATE				X	X
CHRYSENE			X	X	X
DIBENZOFURAN					X
DIBENZO(A,H)ANTHRACENE					X
DIETHYLPHTHALATE				X	
DIMETHYLPHTHALATE					X
DI-N-BUTYLPHTHALATE				X	X
DI-N-OCTYL PHTHALATE				X	X
FLUORANTHENE			X		X
FLUORENE				X	X
HEXACHLOROBENZENE				X	X
IDENO(1,2,3-CD)PYRENE			X		X
ISOPHORONE	X		X	X	X
NAPHTHALENE				X	X
N-NITROSODIPHENYLAMINE					X
PHENANTHRENE			X	X	X
PHENOL				X	X
PYRENE			X	X	X
PESTICIDES/PCBs					
ALDRIN					X
AROCLOR-1254					X
AROCLOR-1260			X	X	X
HEPTACHLOR EPOXIDE					X
INORGANICS					
ALUMINUM	X	X	X	X	X
ANTIMONY	X		X	X	X

CHEMICALS DETECTED AT THE FISHER-CALO SITE

AREA C

COMPOUNDS	GROUND-WATER	SURFACE WATER	SEDIMENT	SUBSUR-FACE SOIL	SURFACE SOIL
INORGANICS					
ARSENIC	X	X	X	X	X
BARIUM	X	X	X	X	X
BERYLLIUM	X	X	X	X	X
CALCIUM	X	X	X	X	X
CHROMIUM	X	X	X	X	X
COBALT	X	X	X	X	X
COPPER	X	X	X	X	X
CYANIDE			X	X	X
IRON	X	X	X	X	X
LEAD	X		X	X	X
MAGNESIUM	X	X	X	X	X
MANGANESE	X	X	X	X	X
MERCURY	X	X	X	X	X
NICKEL	X	X	X	X	X
POTASSIUM	X	X	X	X	X
SODIUM	X	X	X	X	X
VANADIUM	X	X	X	X	X
ZINC	X	X	X	X	X

CHEMICALS DETECTED AT THE FISHER-CALO SITE

AREA D

COMPOUNDS	GROUND-WATER	SUBSUR-FACE SOIL	SURFACE SOIL
VOLATILE ORGANICS			
1,1,1-TRICHLOROETHANE	X		X
1,1-DICHLOROETHANE	X		
2-HEXANONE		X	
4-METHYL-2-PENTANONE		X	X
ACETONE		X	X
CARBON DISULFIDE			X
CHLOROFORM	X		
METHYLENE CHLORIDE		X	
TETRACHLOROETHANE			X
TOLUENE		X	X
TRICHLOROETHENE	X		
XYLENES			X
SEMIVOLATILE ORGANICS			
4-NITROPHENOL			X
BIS(2-ETHYLHEXYL)PHTHALATE		X	X
DIETHYLPHTHALATE		X	
DI-N-BUTYLPHTHALATE		X	
DI-N-OCTYL PHTHALATE		X	
PHENOL			X
PESTICIDES/PCBs			
4,4-DDD			X
4,4-DDE			X
4,4-DDT			X
DELTA-BHC			X
DIELDRIN			X
HEPTACHLOR EPOXIDE			X
METHOXYCHLOR		X	X
METHOXYCHLOR			X
INORGANICS			
ALUMINUM	X	X	X
ANTIMONY	X	X	X
ARSENIC	X	X	X
BARIUM	X	X	X

CHEMICALS DETECTED AT THE FISHER-CALO SITE

AREA D

COMPOUNDS	GROUND-WATER	SUBSUR-FACE SOIL	SURFACE SOIL
INORGANICS			
BERYLLIUM	X	X	X
CALCIUM	X	X	X
CHROMIUM	X	X	X
COBALT	X	X	X
COPPER	X	X	X
CYANIDE		X	X
IRON	X	X	X
LEAD	X	X	X
MAGNESIUM	X	X	X
MANGANESE	X	X	X
MERCURY	X	X	X
NICKEL	X	X	X
POTASSIUM	X	X	X
SODIUM	X	X	X
VANADIUM	X	X	X
ZINC	X	X	X

COMPOUNDS DETECTED AT THE FISHER-CALO SITE

AREA E

COMPOUNDS	GROUND-WATER	SUBSUR-FACE SOIL	SURFACE SOIL
VOLATILE ORGANICS			
1,1,1-TRICHLOROETHANE	X		
4-METHYL-2-PENTANONE		X	
ACETONE			X
CHLOROFORM		X	
METHYLENE CHLORIDE		X	
TOLUENE		X	
SEMIVOLATILE ORGANICS			
BIS(2-ETHYLHEXYL)PHTHALATE		X	X
BUTYL BENZYL PHTHALATE		X	
ISOPHORONE		X	X
NAPHTHALENE			X
PESTICIDES/PCBs			
ALDRIN			X
AROCLOR-1260		X	
HEPTACHLOR EPOXIDE			X
INORGANICS			
ALUMINUM	X	X	X
ANTIMONY	X	X	X
ARSENIC	X	X	X
BARIUM	X	X	X
BERYLLIUM	X	X	X
CALCIUM	X	X	X
CHROMIUM	X	X	X
COBALT	X	X	X
COPPER	X	X	X
CYANIDE		X	X
IRON	X	X	X
LEAD	X	X	X
MAGNESIUM	X	X	X
MANGANESE	X	X	X
MERCURY	X	X	X
NICKEL	X	X	X
POTASSIUM	X	X	X
SODIUM	X	X	X
VANADIUM	X	X	X
ZINC	X	X	X

CHEMICALS DETECTED AT THE FISHER-CALO SITE

AREA F

COMPOUNDS	GROUND-WATER	SURFACE WATER	SEDIMENT	SUBSUR-FACE SOIL	SURFACE SOIL
VOLATILE ORGANICS					
1,1,1-TRICHLOROETHANE				X	
1,2-DICHLOROETHENE				X	
4-METHYL-2-PENTANONE				X	
CHLOROFORM	X			X	
METHYLENE CHLORIDE		X		X	
TETRACHLOROETHENE				X	
TOLUENE			X		
TRICHLOROETHENE				X	
SEMIVOLATILE ORGANICS					
2-METHYLNAPHTHALENE				X	
4-METHYLPHENOL			X	X	
ANTHRACENE				X	
BENZOIC ACID				X	
BENZYL ALCOHOL				X	
BIS(2-ETHYLHEXYL)PHTHALATE				X	
BUTYL BENZYL PHTHALATE				X	
CHRYSENE				X	
DI-N-BUTYLPHTHALATE				X	
FLUORANTHENE				X	
ISOPHORONE				X	
NAPHTHALENE				X	
PHENANTHRENE				X	
PHENOL			X	X	
PYRENE				X	
PESTICIDES/PCBs					
AROCLOR-1260				X	
INORGANICS					
ALUMINUM	X	X	X	X	X
ANTIMONY	X		X	X	X
ARSENIC	X		X	X	X
BARIUM	X	X	X	X	X
BERYLLIUM	X		X	X	X
CALCIUM	X		X	X	X
CHROMIUM	X	X	X	X	X
COBALT	X		X	X	X

CHEMICALS DETECTED AT THE FISHER-CALO SITE

AREA F

COMPOUNDS	GROUND-WATER	SURFACE WATER	SEDIMENT	SUBSUR-FACE SOIL	SURFACE SOIL
INORGANICS					
COPPER	X		X	X	X
CYANIDE			X	X	X
IRON	X	X	X	X	X
LEAD	X	X	X	X	X
MAGNESIUM	X	X	X	X	X
MANGANESE	X	X	X	X	X
MERCURY	X		X	X	X
NICKEL	X		X	X	X
POTASSIUM	X	X	X	X	X
SODIUM	X	X	X	X	X
VANADIUM	X		X	X	X
ZINC	X		X	X	X

CHEMICALS DETECTED AT THE FISHER-CALO SITE

SURFACE WATER AND SEDIMENTS

COMPOUNDS	SURFACE WATER	SEDIMENTS
VOLATILE ORGANICS		
1,1-DICHLOROETHANE	X	X
1,2-DICHLOROETHENE	X	X
2-HEXANONE		X
4-METHYL-2-PENTANONE		X
ACETONE	X	X
BROMOMETHANE		X
CARBON TETRACHLORIDE	X	X
CHLOROETHANE		X
CHLOROFORM	X	X
METHYLENE CHLORIDE	X	X
STYRENE		X
TETRACHLOROETHENE		X
TOLUENE		X
TRICHLOROETHENE	X	X
SEMIVOLATILE ORGANICS		
2-METHYLNAPHTHALENE		X
2-METHYLPHENOL		X
4-METHYLPHENOL		X
ACENAPHTHALENE		X
ACENAPHTHENE		X
ANTHRACENE		X
BENZOIC ACID		X
BENZO(A)ANTHRACENE		X
BENZO(A)PYRENE		X
BENZO(B)FLUORANTHENE		X
BENZO(G,H,I)PERYLENE		X
BENZO(K)FLUORANTHENE		X
BIS(2-ETHYLHEXYL)PHTHALATE		X
BUTYLBENZYLPHTHALATE		X
CHRYSENE		X
DIBENZO(A,H)ANTHRACENE		X
DI-N-BUTYL PHTHALATE		X
FLUORANTHENE		X
FLUORENE		X
IDENO(1,2,3-CD)PYRENE		X
ISOPHORONE		X
NAPHTHALENE		X

CHEMICALS DETECTED AT THE FISHER-CALO SITE

SURFACE WATER AND SEDIMENTS

COMPOUNDS	SURFACE WATER	SEDIMENTS
SEMIVOLATILE ORGANICS		
PHENANTHRENE		X
PHENOL		X
PYRENE		X
PESTICIDES/PCBs		
AROCLOR-1260		X
BETA-BHC		X
DIELDRIN		X
INORGANICS		
ALUMINUM	X	X
ANTIMONY	X	X
ARSENIC	X	X
BARIUM	X	X
BERYLLIUM	X	X
CALCIUM	X	X
CHROMIUM	X	X
COBALT	X	X
COPPER	X	X
CYANIDE	X	X
IRON	X	X
LEAD	X	X
MAGNESIUM	X	X
MANGANESE	X	X
MERCURY	X	X
NICKEL	X	X
POTASSIUM	X	X
SODIUM	X	X
VANADIUM	X	X
ZINC	X	X