

TULSA DISPOSAL, LLC

TULSA, OKLAHOMA

APPENDIX 2

FIGURES

And

CORRECTIVE MEASURE SCHEMATICS

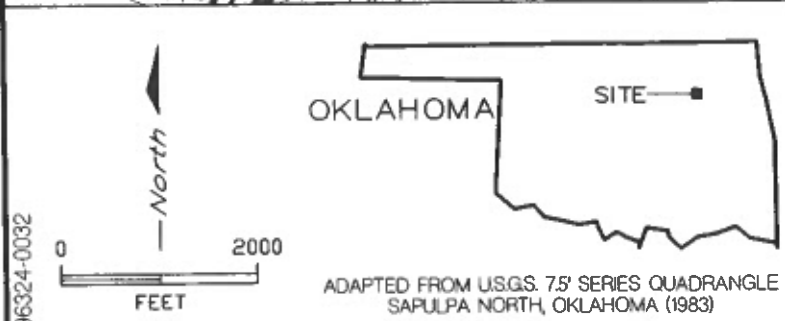
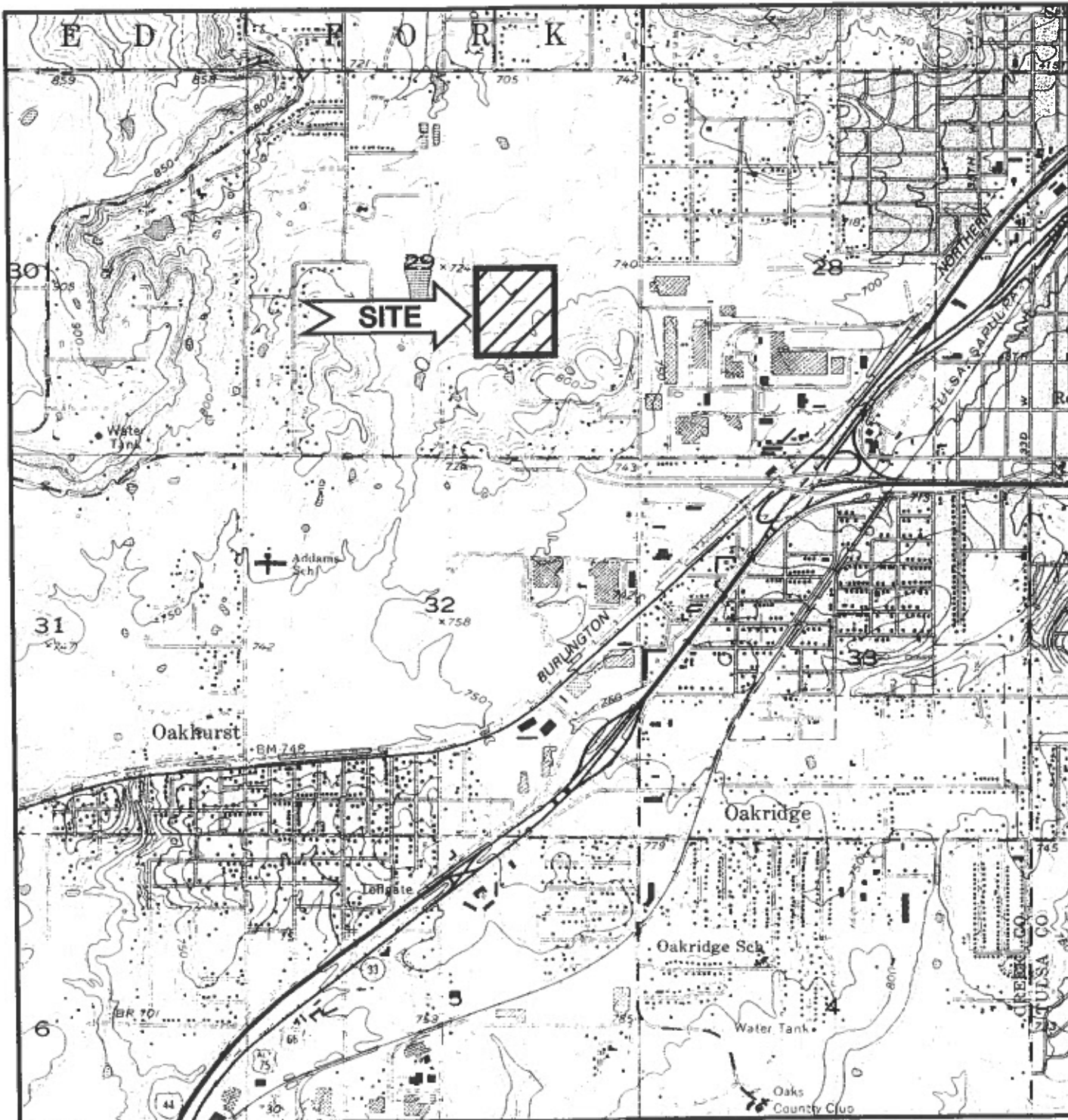
TABLE OF CONTENTS

Appendix 2 – Figures (listed in order)

Figure 1	Facility Location and Property Boundaries
Figure 2	Facility Site Plan and Groundwater Monitoring Well Locations
Figure 3	Extent of 100-Year Flood Zone
Figure 4	Land Ownership in the Vicinity of the Facility
Figure 5	Site Layout and Fire Hydrant Locations
Figure 6	Hospital Route
Figure 7	Closure Schedule
Figure 8	Pre-Pumping and Pumping Groundwater Contour Map - 6/1996 to 4/2015
Figure 9	Total COC Concentration in Groundwater, Clay-Clayey Shale Unit - 6/1996 to 4/2015
Figure 10	Cumulative Groundwater Pumped and COC Mass Recovered vs. Time
Figure 11	Average Total COC Concentration and COC Mass recovered vs. Time

CORRECTIVE MEASURE SCHEMATICS

Figure 1	Process Flow Diagram, Groundwater Recovery System
Figure 2	Piping and Instrumentation, Groundwater Recovery System



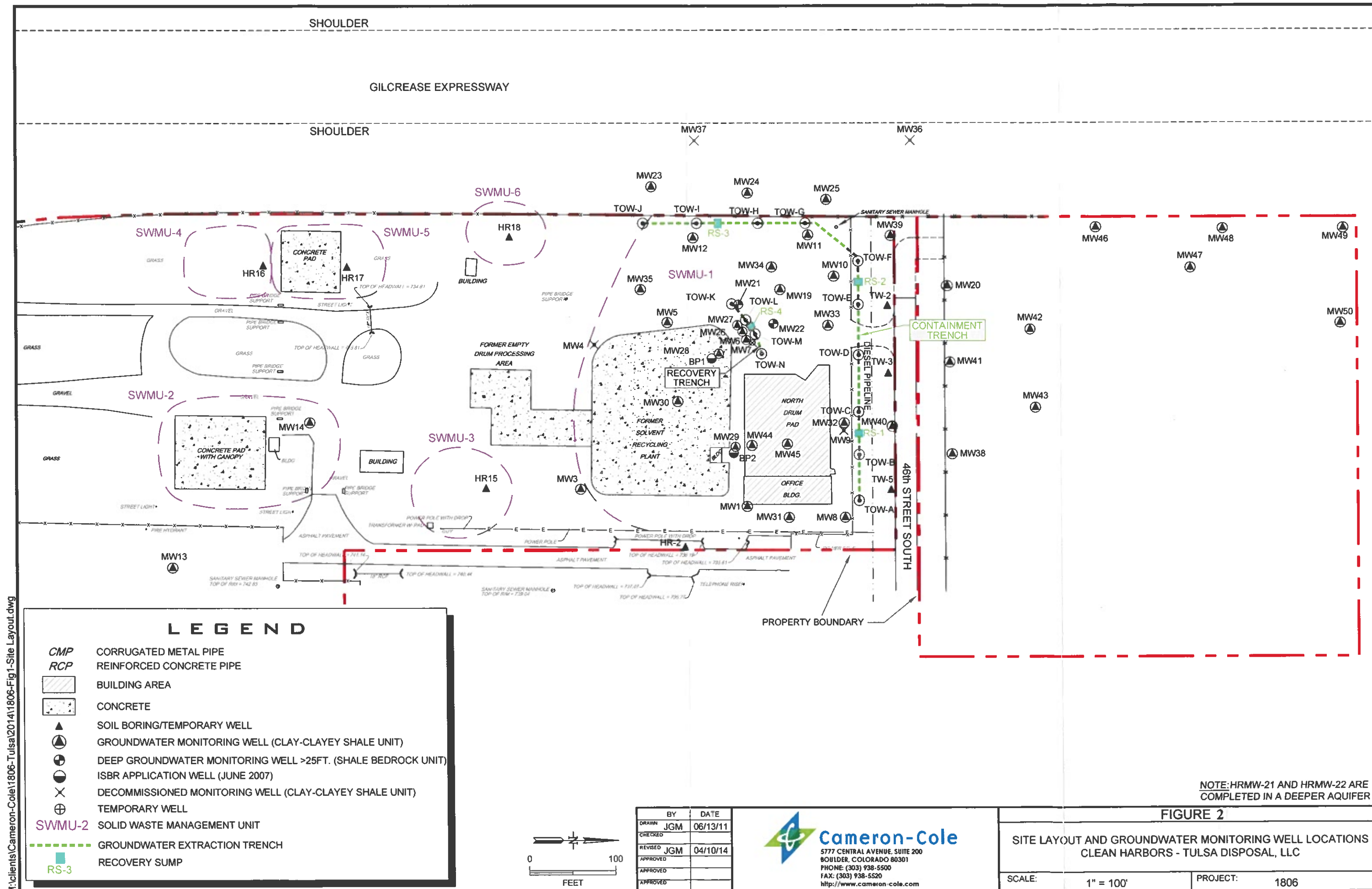
CAMERON-COLE

CLEAN HARBORS, TULSA DISPOSAL, LLC

FIGURE 1
FACILITY LOCATION AND
PROPERTY BOUNDARIES

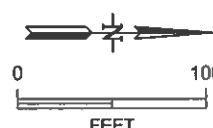
SCALE 1" = 2000'	DATE 5/24/99
---------------------	-----------------

M:\clients\Cameron-Cole\1806-Tulsa\2014\1806-Fig1-Site Layout.dwg



LEGEND

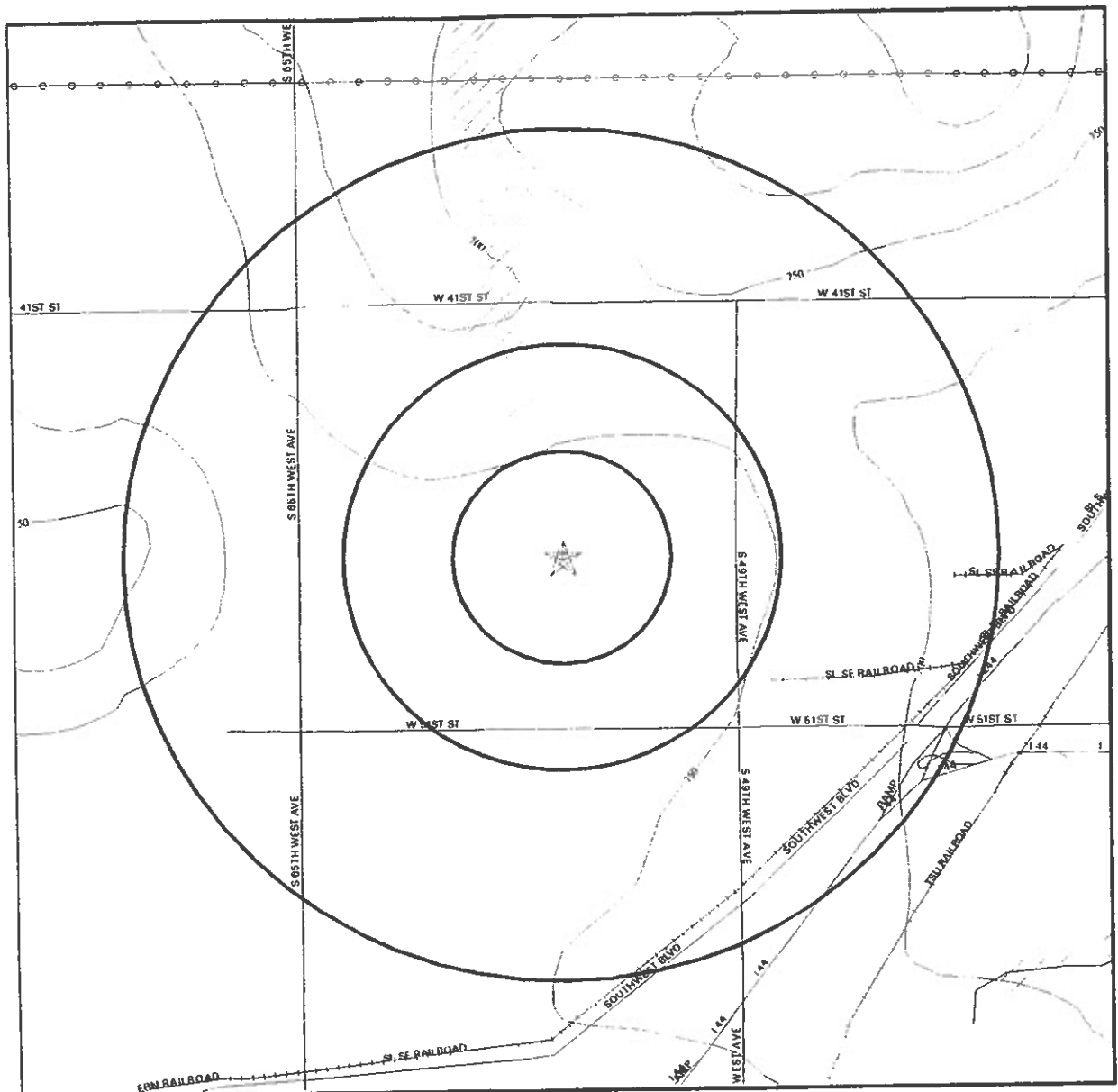
- CMP** CORRUGATED METAL PIPE
- RCP** REINFORCED CONCRETE PIPE
- BUILDING AREA
- CONCRETE
- SOIL BORING/TEMPORARY WELL
- GROUNDWATER MONITORING WELL (CLAY-CLAYEY SHALE UNIT)
- DEEP GROUNDWATER MONITORING WELL >25FT. (SHALE BEDROCK UNIT)
- ISBR APPLICATION WELL (JUNE 2007)
- DECOMMISSIONED MONITORING WELL (CLAY-CLAYEY SHALE UNIT)
- TEMPORARY WELL
- SWMU-2** SOLID WASTE MANAGEMENT UNIT
- GROUNDWATER EXTRACTION TRENCH
- RS-3** RECOVERY SUMP



BY	DATE
DRAWN	JGM 06/13/11
CHECKED	
REVISED	JGM 04/10/14
APPROVED	
APPROVED	
APPROVED	

Cameron-Cole
5777 CENTRAL AVENUE, SUITE 200
BOULDER, COLORADO 80301
PHONE: (303) 938-5500
FAX: (303) 938-5520
<http://www.cameron-cole.com>

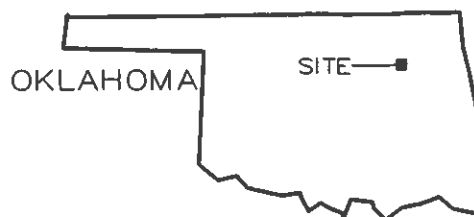
FIGURE 2		
SITE LAYOUT AND GROUNDWATER MONITORING WELL LOCATIONS CLEAN HARBORS - TULSA DISPOSAL, LLC		
SCALE:	1" = 100'	PROJECT: 1806



Source: US Geological Survey 1-Degree Digital Elevation Model
Compiled 09/15/92



- Major Roads
- Contour lines (25 foot interval unless otherwise shown)
- Waterways
- Wells within search distance to Target Property
- Earthquake Epicenters (Richter 5 or greater)
- Power lines
- Pipe lines
- Fault lines
- Water
- 100-year flood zone
- 500-year flood zone



CAMERON-COLE

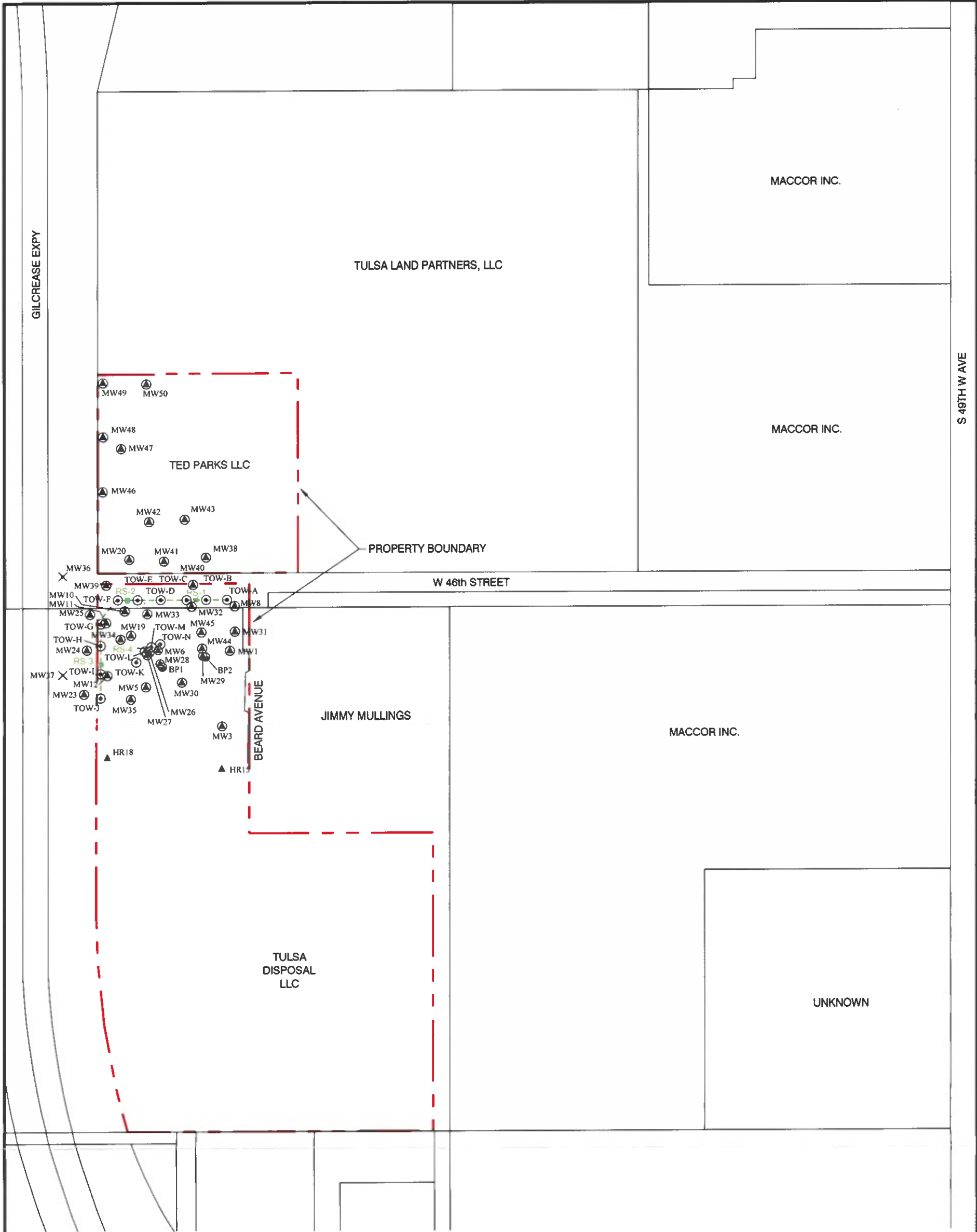
CLEAN HARBORS, TULSA DISPOSAL, LLC

**FIGURE 3
EXTENT OF 100 YEAR FLOOD ZONE**

SCALE: SEE BAR

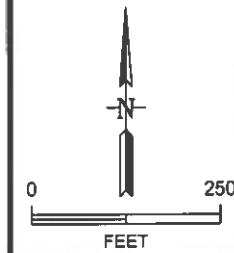
DATE: 5/24/99

96324-0034



LEGEND

- MONITORING WELL
- ISBR APPLICATION WELL
- DECOMMISSIONED WELL
- TRENCH OBSERVATION WELL
- SOIL BORING/TEMPORARY WELL
- TEMPORARY WELL
- GROUNDWATER EXTRACTION TRENCH
- RECOVERY SUMP



BY	DATE
DRAWN JGM	08/06/13
CHECKED	
REVISED JGM	04/10/14
APPROVED	
APPROVED	
APPROVED	

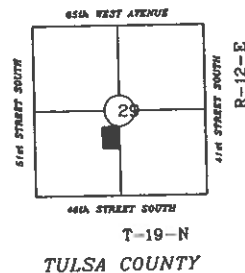


Cameron-Cole
5777 CENTRAL AVENUE, SUITE 200
BOULDER, COLORADO 80301
PHONE: (303) 938-5500
FAX: (303) 938-5520
<http://www.cameron-cole.com>

FIGURE 4

SITE AND SURROUNDING PROPERTIES
CLEAN HARBORS - TULSA DISPOSAL, LLC

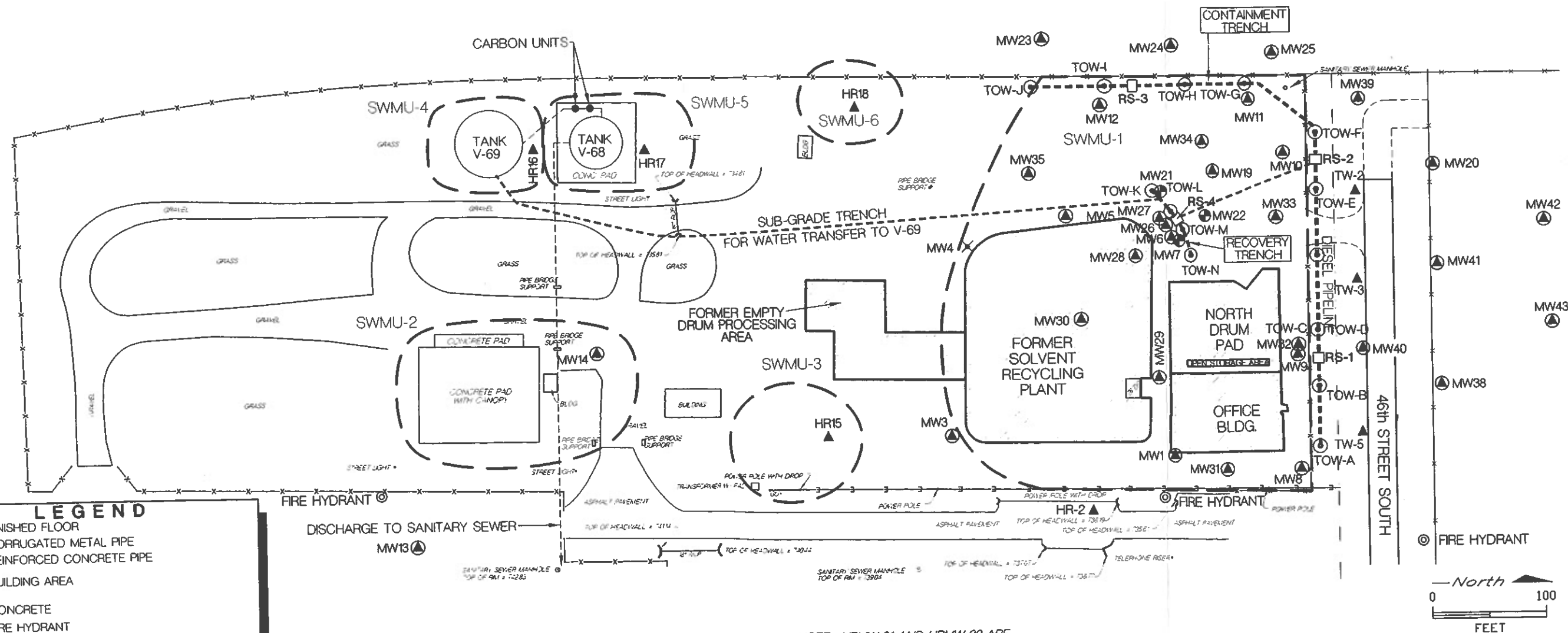
SCALE: 1" = 100' PROJECT: 1806



65th STREET SOUTH
46th STREET SOUTH
44th STREET SOUTH
T-19-N
R-12-E
TULSA COUNTY

T-19-N
R-12-E
TULSA COUNTY

SHOULDER
CURRENT 55th WEST AVENUE
PROPOSED 55th WEST AVENUE EXPANSION
SHOULDER



LEGEND

- FF FINISHED FLOOR
- CMF CORRUGATED METAL PIPE
- RCP REINFORCED CONCRETE PIPE
- BUILDING AREA
- CONCRETE
- FIRE HYDRANT
- SOIL BORING
- GROUNDWATER MONITORING WELL
- DEEP GROUNDWATER MONITORING WELL >25FT.
- DECOMMISSIONED MONITORING WELL
- SWMU-2 SOLID WASTE MANAGEMENT UNIT
- RS-3 RECOVERY SUMP

NOTE: HRMW-21 AND HRMW-22 ARE COMPLETED IN A DEEPER AQUIFER

BY	DATE
DRAWN WRB	11/2/98
CHECKED	
APPROVED	
APPROVED	
APPROVED	



CAMERON-COLE

CLEAN HARBORS, TULSA DISPOSAL, LLC

FIGURE 5
SITE LAYOUT AND FIRE HYDRANT LOCATIONS

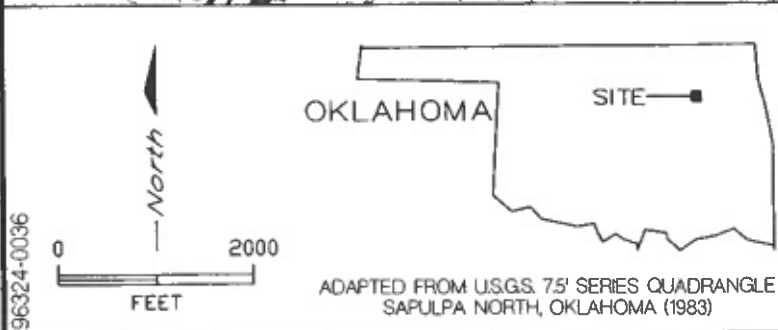
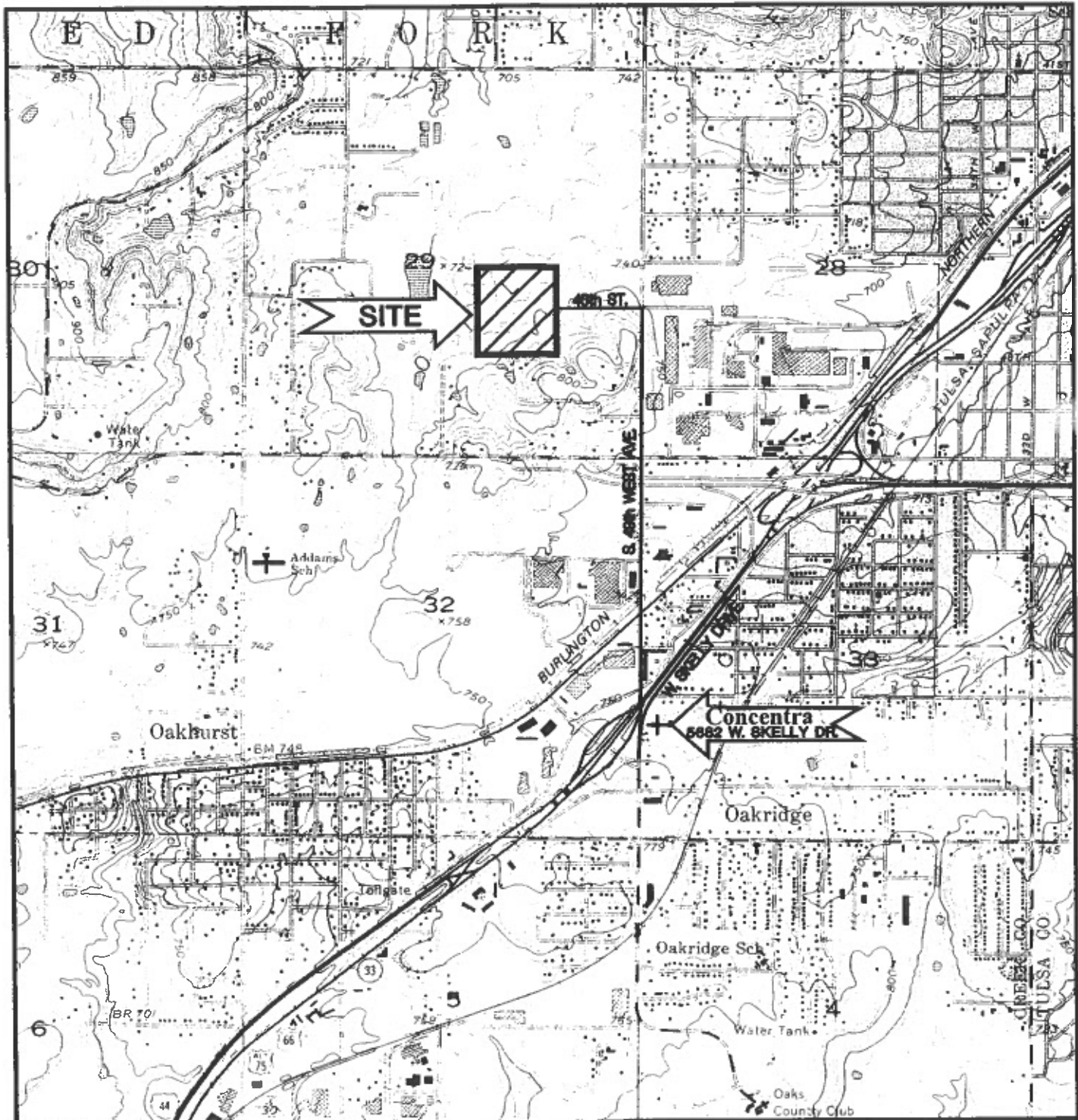
SCALE

1" = 100'

DWG. NO:

96324-0035





CAMERON-COLE

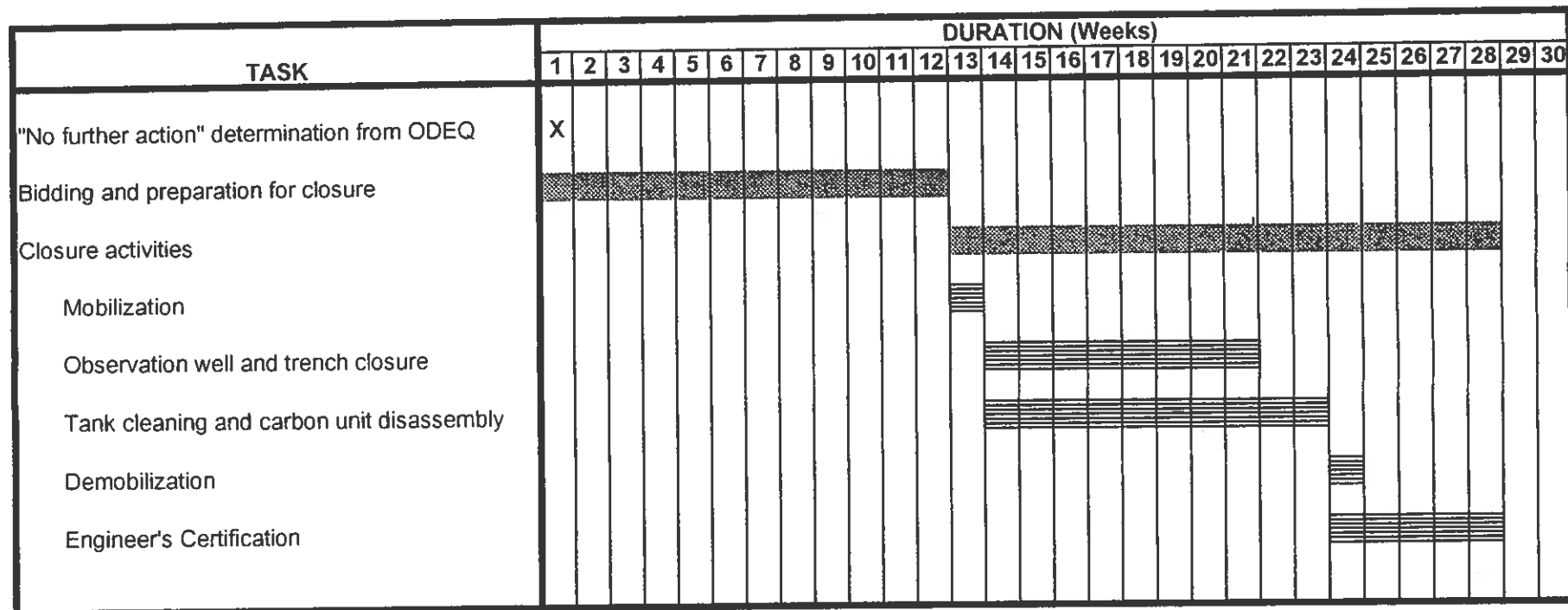
CLEAN HARBORS, TULSA DISPOSAL, LLC

**FIGURE 6
HOSPITAL ROUTE AND
LOCATION MAP**

SCALE
1" = 2000'

DATE
6/2/99

FIGURE 7
CLEAN HARBORS, TULSA DISPOSAL, LLC
CLOSURE SCHEDULE



JUNE 1996

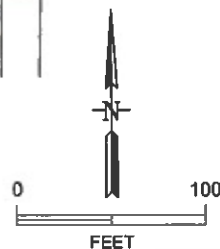
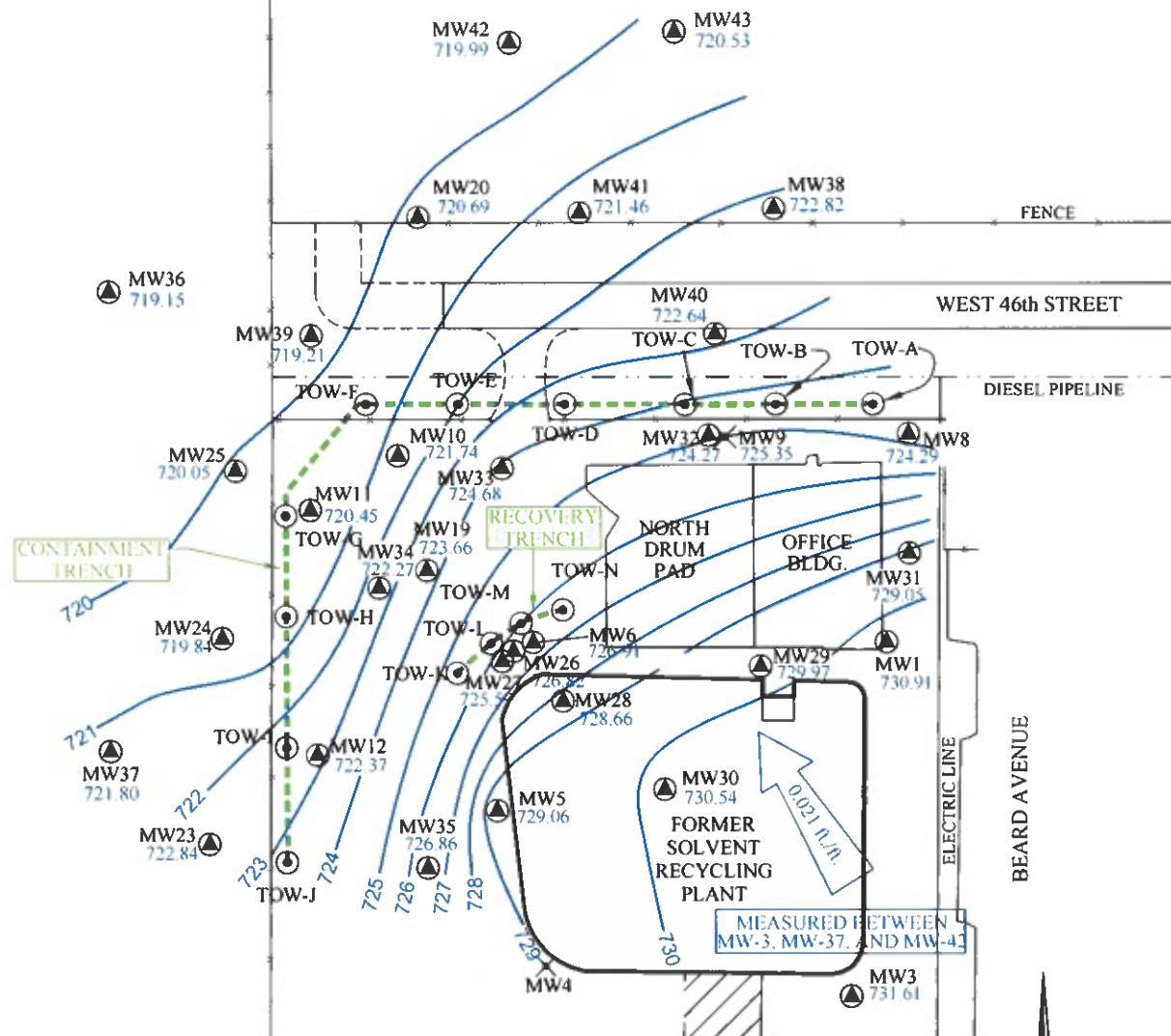
APRIL 2015

LEGEND

- ▲ SOIL BORING
- MONITORING WELL
- ⊗ DECOMMISSIONED WELL
- ⊙ TRENCH OBSERVATION WELL
- GROUNDWATER EXTRACTION TRENCH
- NM NOT MEASURED
- 730.26 GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)
- NOT CONTOURED
- 730— GROUNDWATER ELEVATION CONTOUR (FEET ABOVE MEAN SEA LEVEL)
- ⊕ GROUNDWATER DEPRESSION (ZONE OF PUMPING INFLUENCE)

GILCREASE EXPRESSWAY

EDGE OF PAVEMENT



BY	DATE
DRAWN JGM	07/23/15
CHECKED	
REVISED	
APPROVED	
APPROVED	
APPROVED	



Cameron-Cole
5777 CENTRAL AVENUE, SUITE 200
BOULDER, COLORADO 80301
PHONE: (303) 938-5500
FAX: (303) 938-5520
<http://www.cameron-cole.com>

GILCREASE EXPRESSWAY

EDGE OF PAVEMENT

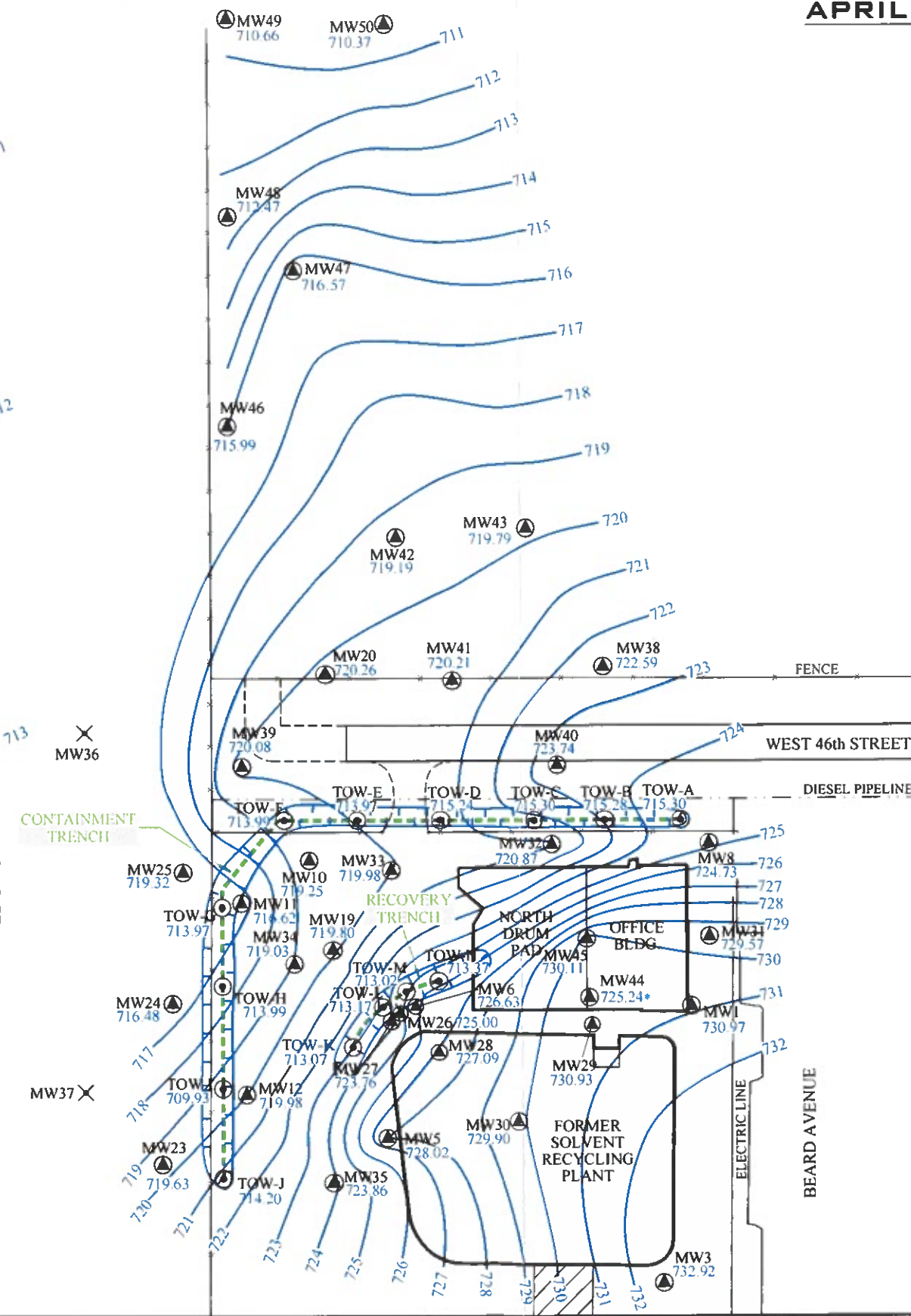
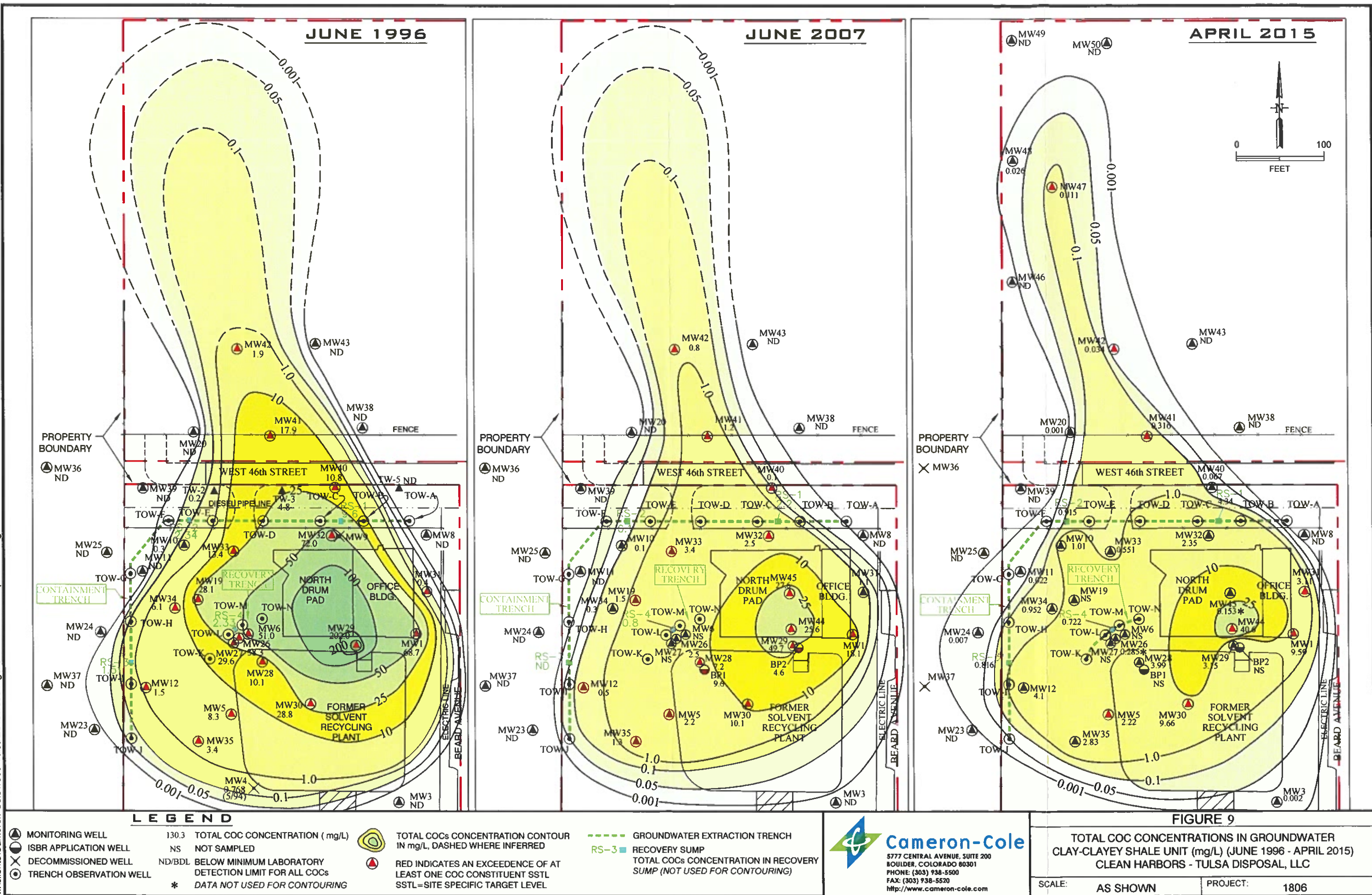


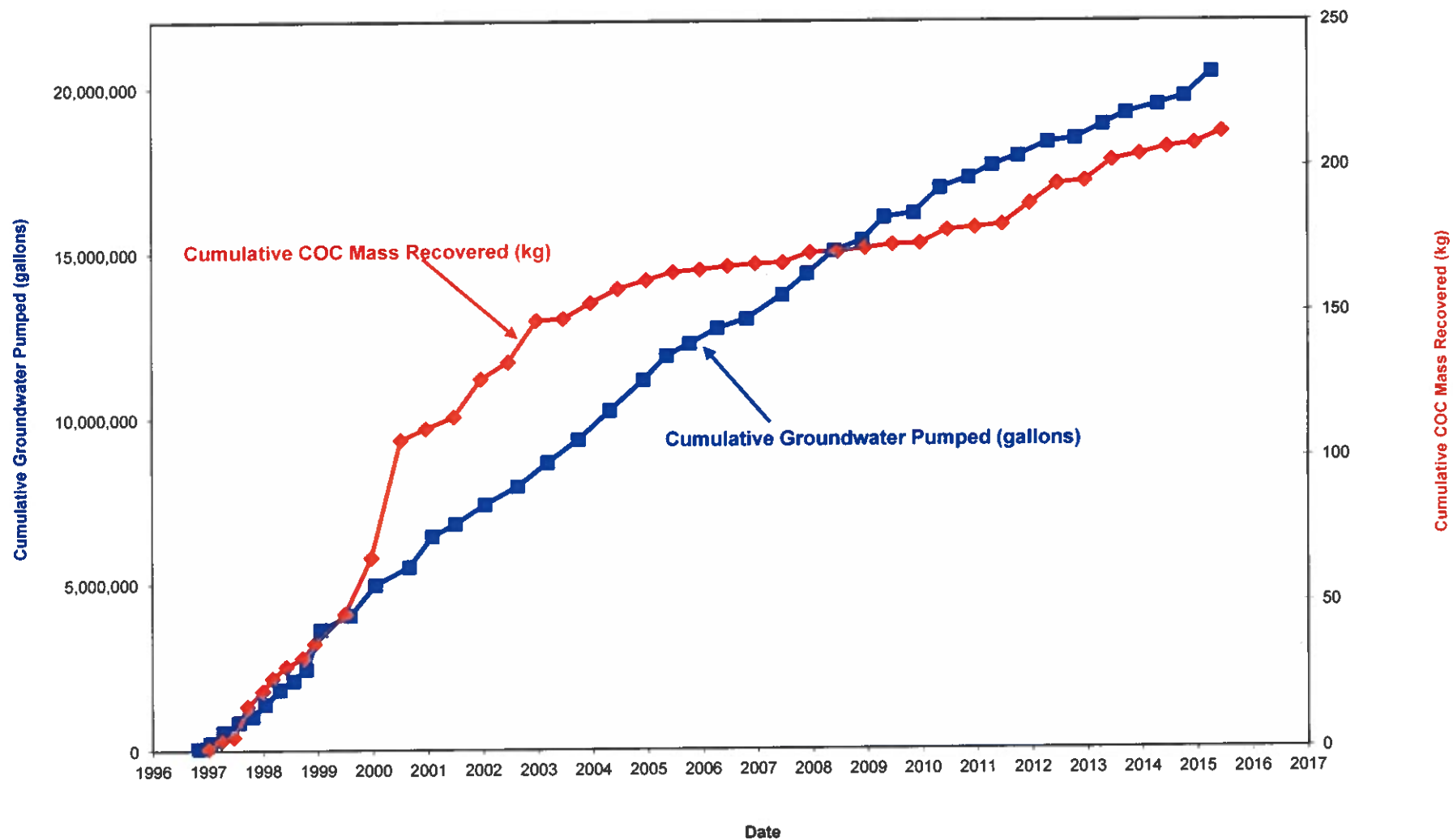
FIGURE 8

PRE-PUMPING AND PUMPING GROUNDWATER ELEVATIONS
CLAY-CLAYEY SHALE UNIT (JUNE 1996 - APRIL-2015)
CLEAN HARBORS - TULSA DISPOSAL, LLC

SCALE: 1" = 100' PROJECT: 1806

M:\clients\Cameron-Cole\1806-Tulsa\2015\1806-Fig5-GW VOCs 1996-Apr-2015.dwg





Cameron-Cole

5777 CENTRAL AVENUE, SUITE 200

BOULDER, COLORADO 80301

PHONE: (303) 938-5500 FAX: (303) 938-5520

<http://www.cameron-cole.com>

FIGURE 10

CUMULATIVE GROUNDWATER PUMPED (gal.) AND
COC MASS RECOVERED (kg.) -vs.- TIME
AVERAGE OF SUMPS RS-1 THROUGH RS-4
CLEAN HARBORS - TULSA DISPOSAL LLC

SCALE:

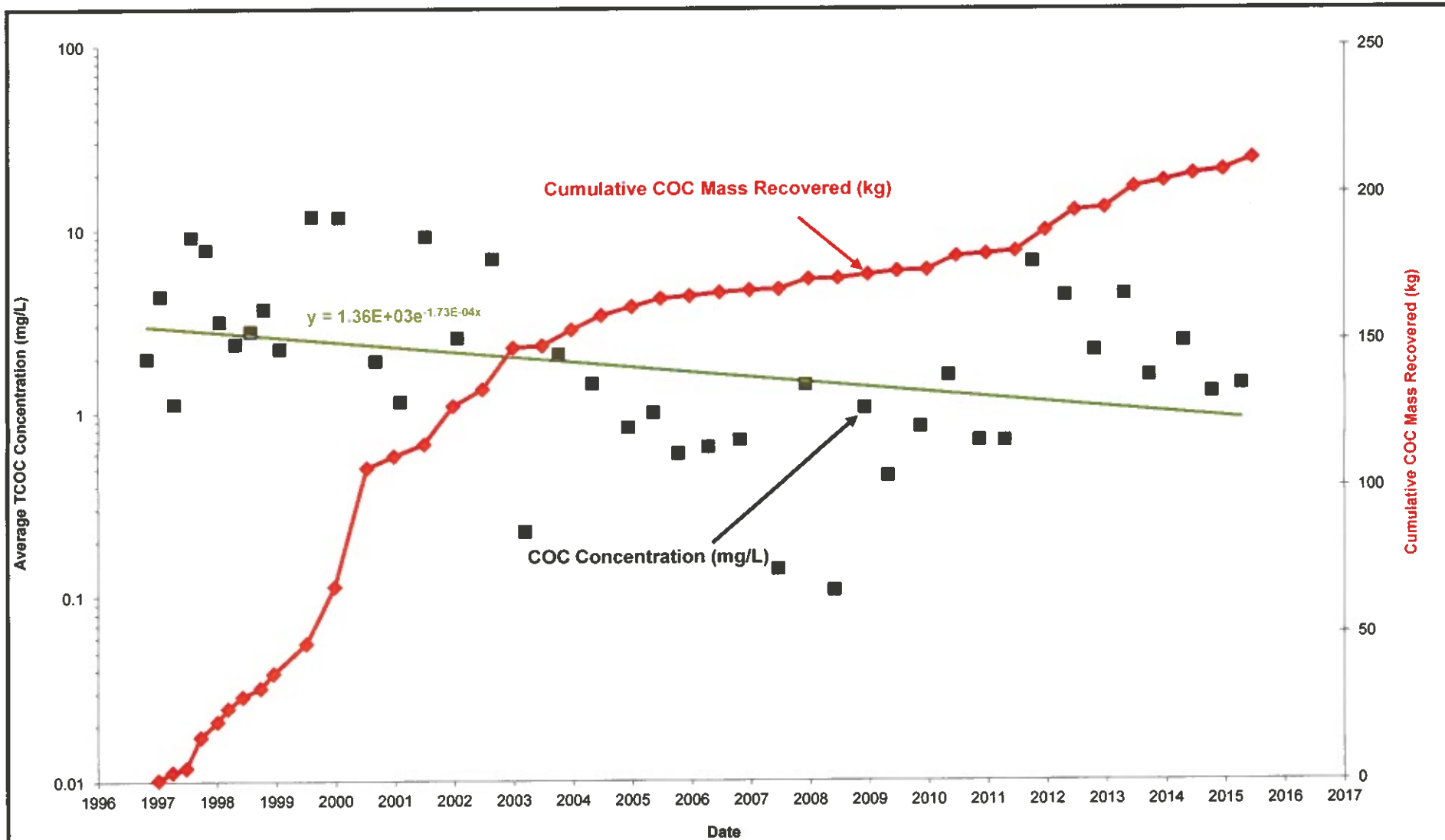
GRAPHS

DATE:

9/1/15

PROJECT:

1806



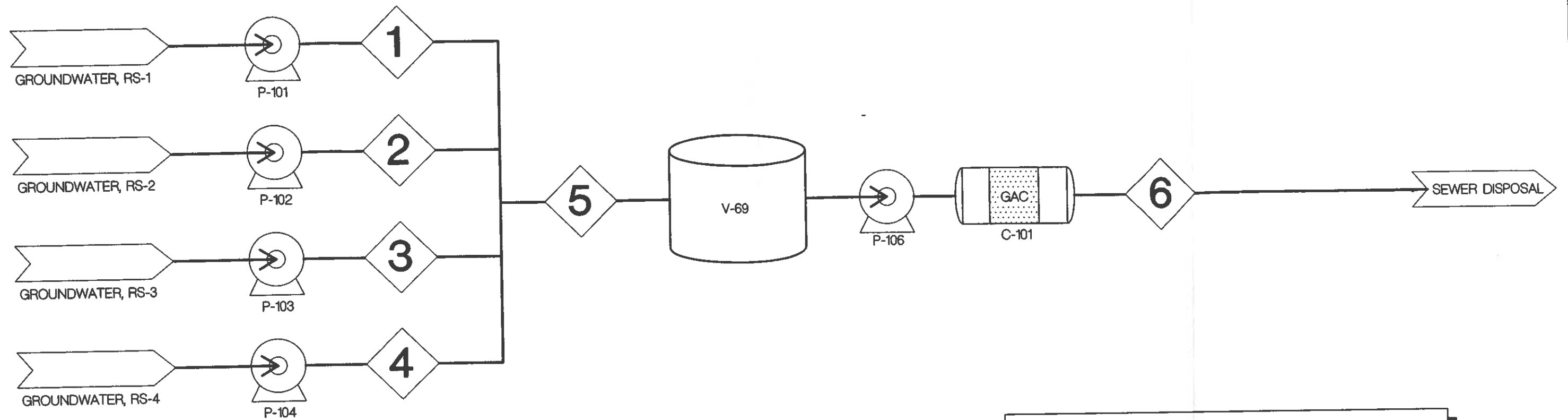
Cameron-Cole

5777 CENTRAL AVENUE, SUITE 200
BOULDER, COLORADO 80301
PHONE: (303) 938-5500 FAX: (303) 938-5520
<http://www.cameron-cole.com>

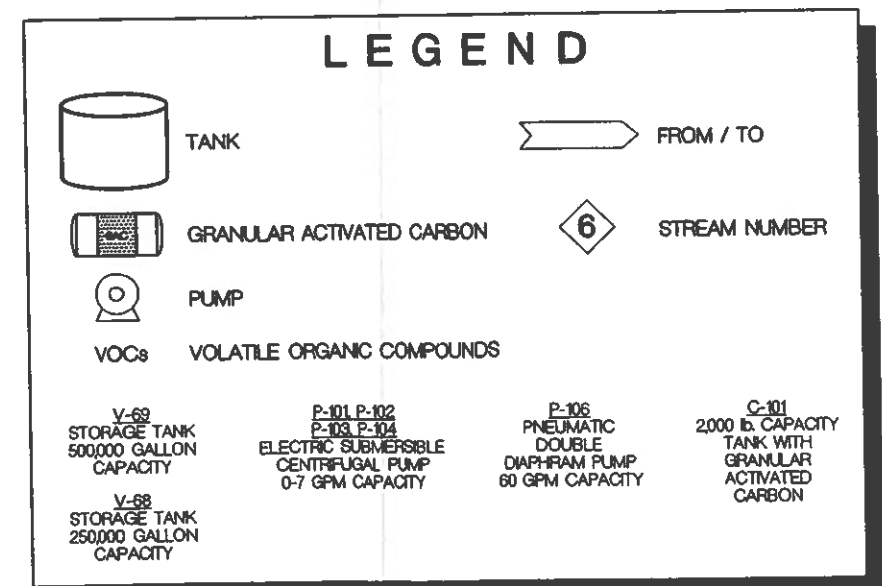
FIGURE 11

**AVERAGE TOTAL COC CONCENTRATION (mg/L)
AND COC MASS RECOVERED (kg.) -vs.- TIME
AVERAGE OF SUMPS RS-1 THROUGH RS-4
CLEAN HARBORS - TULSA DISPOSAL LLC**

SCALE: GRAPHS	DATE: 1/8/15	PROJECT: 1806
---------------	--------------	---------------



STREAM NUMBER	1	2	3	4	5	6
STREAM NAME	RS-1 WATER	RS-2 WATER	RS-3 WATER	RS-4 WATER	RECOVERED WATER	TREATED WATER
FLOW (gpm)	0.5	1.0	0.5	0.2	0-20	0-250
CONCENTRATION (TOTAL VOCs) (mg/L)	15.4	0.42	0.25	3.5	3.2	0

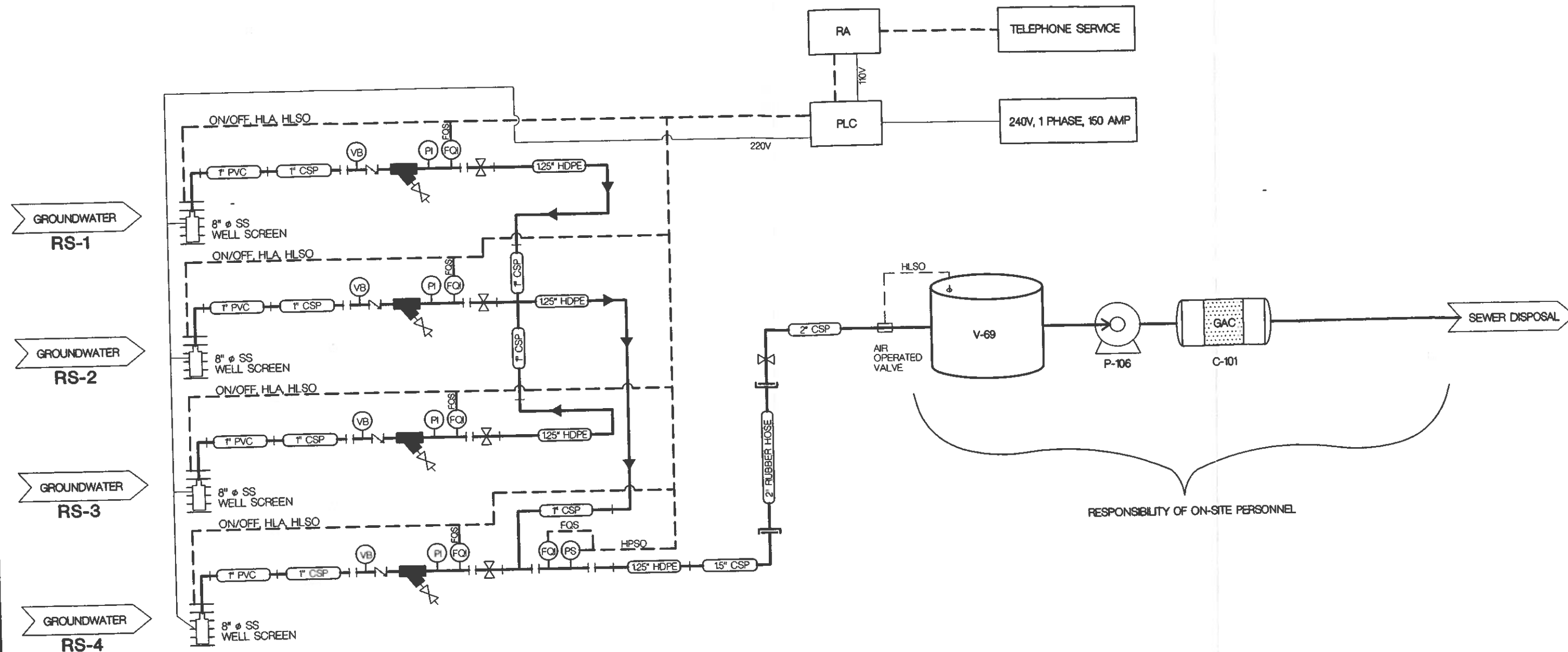


BY	DATE
DRAWN WRB	8/5/03
CHECKED	
APPROVED	
APPROVED	
APPROVED	



CAMERON-COLE

FIGURE 1		
PROCESS FLOW DIAGRAM GROUNDWATER RECOVERY SYSTEM CLEAN HARBORS, TULSA DISPOSAL, LLC		
SCALE:	SCHMATIC	DWG. NO.: 1806-13



LEGEND

	TANK		SAMPLE PORT		VACUUM BREAK
	GRANULAR ACTIVATED CARBON		GATE VALVE		PRESSURE INDICATOR
	TRANSFER PUMP		CHECK VALVE		FLOW QUANTITY INDICATOR
	SUBMERSIBLE PUMP		1/2" STRAINER		PRESSURE SWITCH
	WELL SCREEN		UNION		PROGRAMMABLE LOGIC CONTROLLER
	FROM / TO		WATER FLOW LINE		REMOTE ALARM
	1" CSP PIPE DIAMETER AND MATERIAL FOR PUMPING WATER		ELECTRICAL CONTROL	PVC	POLY VINYL CHLORIDE
			ELECTRICAL POWER	FQS	FLOW QUANTITY SIGNAL
				HPSO	HIGH PRESSURE SHUT-OFF
				HILA	HIGH LEVEL ALARM
				HLSO	HIGH LEVEL SHUT-OFF

BY	DATE
WRB	8/5/03
CHECKED	
APPROVED	
APPROVED	
APPROVED	



FIGURE 2		
PIPING & INSTRUMENTATION DIAGRAM GROUNDWATER RECOVERY SYSTEM CLEAN HARBORS, TULSA DISPOSAL, LLC		
SCALE:	SCHEMATIC	DWG. NO.: 1806-14