Department of Energy

Portsmouth/Paducah Project Office
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Lexington, Kentucky 40513
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AUG 24 2012

Mr. Wm. Turpin Ballard
Remedial Project Manager
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street
Atlanta, Georgia 30303

PPPO-02-1545749-12

Mr. Todd Mullins, FFA Manager
Kentucky Department for Environmental Protection
Division of Waste Management
200 Fair Oaks Lane, 2nd Floor
Frankfort, Kentucky 40601

Dear Mr. Ballard and Mr. Mullins:

TRANSMITTAL OF PAGE CHANGES FOR REMEDIAL DESIGN REPORT, CERTIFIED FOR CONSTRUCTION DESIGN DRAWINGS AND TECHNICAL SPECIFICATIONS PACKAGE, FOR THE GROUNDWATER OPERABLE UNIT FOR THE PHASE IIA VOLATILE ORGANIC COMPOUND CONTAMINATION AT THE C-400 CLEANING BUILDING AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY (DOE/LX/07-1272&D2/R1)

Reference: Letter from W. Ballard to R. Knerr, Untitled [Subject: EPA conditional approval of the Remedial Design Report, Certified for Construction Design Drawings and Technical Specifications Package for the Groundwater Operable Unit (OU19) at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah Kentucky (DOE/LX/07-1272&D2)], dated June 2012

Please find enclosed the certified page changes to the *Remedial Design Report, Certified for Construction Design Drawings and Technical Specifications Package, for the Groundwater Operable Unit for the Phase IIa Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1272&D2/R1 (RDR). The enclosed page changes incorporate responses to conditions for approval received from the U.S. Environmental Protection Agency (EPA) on July 30, 2012. Responses to EPA's conditions and clarifications are consistent with those discussed and agreed to among Federal Facility Agreement parties via teleconference August 7, 2012. Please replace pages in the June 2012 RDR (transmitted June 18, 2012) with the enclosed pages.

The U.S. Department of Energy (DOE) requests concurrence on page changes to the RDR by September 7, 2012, to facilitate a construction start date of September 28, 2012. In the event there are unresolved comments at that time that are unrelated to construction activities, DOE

requests that the agencies consider providing conditional approval to allow construction start by September 28, 2012.

A comment response summary and redline are also provided to assist with your review. If you have any questions or require additional information, please contact David Dollins at (270) 441-6819.

Sincerely,

Reinhard Knerr
Paducah Site Lead
Portsmouth/Paducah Project Office

Enclosures:
1. Certification Page
2. Page changes to the C-400 Phase IIa RDR
3. EPA Comment Response Summary

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CERTIFICATION

Document Identification: **Page changes to *Remedial Design Report, Certified for Construction Design Drawings and Technical Specifications Package, for the Groundwater Operable Unit for the Phase IIa Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* DOE/LX/07-1272&D2/R1**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

LATA Environmental Services of Kentucky, LLC

Mark J. Duff, Paducah Project Manager — Date Signed: 8-23-12

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

U.S. Department of Energy

Reinhard Knerr, Paducah Site Lead
Portsmouth/Paducah Project Office — Date Signed: 8/23/12

DOE/LX/07-1272&D2/R1
Primary Document

Remedial Design Report, Certified for Construction Design Drawings and Technical Specifications Package, for the Groundwater Operable Unit for the Phase IIa Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

CLEARED FOR PUBLIC RELEASE

DOE/LX/07-1272&D2/R1
Primary Document

Remedial Design Report, Certified for Construction Design Drawings and Technical Specifications Package, for the Groundwater Operable Unit for the Phase IIa Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued—August 2012

Prepared for the
U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
LATA ENVIRONMENTAL SERVICES OF KENTUCKY, LLC
managing the
Environmental Remediation Activities at the
Paducah Gaseous Diffusion Plant
under contract DE-AC30-10CC40020

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Table 1 Project Technical Summary

Item	Description	Comments
Site Characteristics		
Treatment Area [ft^2]	13,224	Based on supplied information
Volume Treated [yd^3]	25,291[1]	Based on 40 ft treatment depth
Deep Extent of Treatment [ft. BGS]	60	Based on supplied information
Shallow Extent of Treatment [ft. BGS]	20	Based on supplied information
Depth to Groundwater [ft. BGS]	~55	Based on supplied information
Contaminants of Concern	TCE	DNAPL suspected
Contaminant Mass in Place [lbs]	193,760	Estimated
Soil Resistivity [Ω·m]	12-200	Measured range of resistivity
Remedial Approach		
ET-DSP™ Electrode (E) Wells	52	10" O.D. x 10' long electrodes
Total Electrodes	156	Triple stack electrode wells
Power Delivery Systems [kVA]	7 x 660 kVA or 2 x 1330 kVA and 2 x 660 kVA	Two options are being explored. Depends on unit availability at time of construction.
digiTAM™ Temperature Sensors	780	39 digiTAM™ wells each with 20 sensors
Vacuum Monitoring Wells	15	V (5), and DV (10)
Total Sensor Boreholes	44	D (29), DV(10), and V(5) wells
Electrode Spacing [ft]	20	Horizontal spacing between wells
Bottom of Deep Electrode [ft BGS]	63.2	Heat transfer 3-4 ft below electrode
Top of Shallow Electrode [ft BGS]	17.9	Heat transfer 3-4 ft above electrode
Target Temperature [°C]	-	See §3.3 of LATA Kentucky's RDR revision
Multiphase Extraction (X) Wells	22	Each MPE well has a pneumatic pump
Upper Vapor Extraction (XE) Wells	39	Vapor extraction at electrode wells
Vapor Extraction (VX) Wells	11	Vapor extraction only
Vapor Recovery Air Flow [scfm]	660-972	Based on Lessons Learned
Vapor Recovery Vacuum Level [inHg]	-15.0	Based on Lessons Learned
Liquid/Condensate Recovery [gpm]	30.6	Average based on simulation
Electrical Power Input [kW]	1,522	Based on simulated formation input power
Summary Information		
Cumulative Energy Input [MWh]	6,576	Based on simulated formation input energy
Average Water Demand [gpm]	25.0	Re-circulation strategy
Time to Target Temp. [days]	50-60	Approximately
Thermal Operations [days]	180	Approximately

[1] The calculation for the volume treated incorporates the thermal influence at the ends of the electrodes. This calculation is shown in Appendix A.

3. ERH System Description

ERH via ET-DSP™ involves heating soil in the saturated and unsaturated zones by passing current between electrodes buried in the soil, with simultaneous injection of water through the electrodes in order to transfer heat by convection. The coupling of electrical heating with heat transfer by convection greatly enhances the efficiency and uniformity of ERH technology. Complete volatilization of each contaminant is achieved as temperature in the soil approaches the boiling point of the contaminant, and simultaneous vapor and liquid extraction removes the contaminants from the subsurface.

Electrical heating increases the temperature of the soil and groundwater by conducting current through the resistive connate water that fills the porosity of the soil. Water injection through the ET-DSP™ electrode—a patented feature of the technology—results in the conductive pathway remaining fully functional. Consequently, there are no resistive or 'cold' zones created within the treatment area. The makeup water supplied to the electrode is continually vaporized and replaced, creating a guided steam front that strips contaminants away and carries them to extraction wells.

In a typical application of ET-DSP™, electrodes are strategically placed into and around the contaminated zone. The pattern of electrodes is designed so conventional three-phase power can be used to heat the soil. The distance between electrodes and their location is determined from the heat transfer mechanisms associated with vapor extraction, electrical heating and fluid movement in the contaminated zone. Vapor recovery and liquid extraction wells are located within the contaminated soil. The position of the extraction wells relative to the electrodes is determined so that heat transfer by convection within the porous soil is maximized, thus minimizing heat loss and increasing the uniformity of the temperature distribution. Consideration of all the heat transfer mechanisms results in the most effective heating process and, hence, a more successful remediation project.

The preliminary design for the thermal remediation of the Phase IIa C-400 Cleaning Building SE treatment area includes:

1. 52 ET-DSP™ electrode wells (E wells)
2. 39 extraction / electrode wells (XE wells);
3. 22 MPE wells (X wells);
4. 11 vapor extraction wells (VX wells);
5. 5 vacuum monitoring wells (V wells);
6. 29 digiTAM™ sensor wells (D wells);
7. 10 digiTAM™ / vacuum monitoring wells (DV wells).

Well field layout for the site is defined in drawings #E7DC40000C014 and #E7DC40000C015 for the two PDS availability scenarios. For all wells shown within the railway buffer zone, surface completions are to be no greater than six inches high. Wellheads in this zone are to be constructed as detailed in drawing #C7DC40000C009 for extraction wells and drawing #C7DC40000C008 for electrode wells. All design drawings are included in Appendix B.

these would need to be placed above the extraction pumps, and too shallow relative to the water table to sample liquid during operations. The sum totals of the designed liquid and vapor extraction flow rates for all extraction wells will average 30.6 gallons per minute (gpm) and 440 standard cubic feet per minute (scfm), respectively.

Vapor extraction wells (VX wells) will be used during operations for vapor extraction only. The vapor screen interval is from 15 to 50 ft BGS. The sum total of the designed vapor extraction flow rates for all VX wells will average 220 scfm at -15 inHg vacuum.

During Phase I operations, the maximum vapor flow rate achieved at -10 inHg of vacuum was 12 scfm. The vapor flow calculation presented in Appendix A indicates a vapor flow rate of 20 scfm per well will be achieved at -15 inHg of vacuum and an effective ROC of 15 ft. Based on the 15 ft ROC, the Phase IIa design has 30 ft maximum distance between extraction well centers to ensure sufficient vacuum over the entire treatment volume.

X wells and VX wells are to be installed as shown in drawing #C7DC40000C006 and extraction wellheads are to be completed as shown in drawing #C7DC40000C009. Drawings are included in Appendix B.

The extraction component of the extraction/electrode well (XE well) will be used to cool the vadose zone between surface and 15 ft BGS to prevent temperature increases above the allowable limits at these depths. The XE wells can also be used to extract vapors that are not captured by the X and VX wells. The vapor screen interval is from 6.6 to 13.1 ft BGS. The sum total of the designed vapor extraction flow rates for all extraction/electrode wells will average 312 scfm at -15 inHg vacuum. Refer to electrode well completion drawings #E7DC40000C016 and #C7DC40000C008 in Appendix B.

3.3. Sensor Wells

Subsurface temperature is the most important operational parameter monitored during an ERH remediation project. Temperature data needs to be current and comprehensive. In order to meet this data need, a uniform distribution of digital Temperature Acquisition Module (digiTAM™) sensors will be deployed in the subsurface at the C-400 SE treatment area. Each temperature sensor responds to the ET-DSP™ site computer as frequently as every five minutes with a current temperature reading. The computer and site operators utilize this temperature feedback to optimize system settings.

To monitor subsurface temperatures, 780 digiTAM™ sensors will be used in 39 digiTAM™ wells (29 D wells and 10 DV wells) uniformly distributed throughout the treatment area.

On the project website, temperature data will be summarized for each sensor point and each well location, with hourly updates. Strategic placement of digiTAMs™ provides an accurate representation of actual temperatures in the subsurface; visualization of temperatures in the treatment volume is accomplished using temperature contour maps. These maps are generated using current digiTAM™ data at the actual sensor location and interpolation of nearby digiTAM™ data for other locations between electrode wells. In addition, temperatures at the electrode wells are calculated using current power levels and cumulative energy inputs at each electrode. These data are input to “kriging” software to create an image file. The contour maps are usually generated on a daily basis to monitor heating progress.

3.1. Electrode Wells

The electrodes are designed to conduct high current to the targeted volume of soil. A minor volume of water injection through each electrode maintains electrical conductivity of the soil, achieves convective heat transfer, and enhances displacement of the chemicals towards the extraction wells. The top electrode in the borehole has a water return line to prevent the subsurface pressure from exceeding the local fracture pressure.

Electrodes are fabricated of high temperature and chemically resistive materials. They are connected to the PDS with appropriately sized electrical cables. As well, each electrode is connected to a water circulation system (WCS) using a high temperature and pressure rated hose. To enhance electrical contact with the soil, each electrode is coated with granular graphite paste over its surface. During well installation, granular graphite will be placed around the electrodes to improve electrical continuity. Automated monitoring and control of the current and water flow to each electrode ensures the system is operating within its design parameters, while preset breakers prevent the electrodes from exceeding the designed amperage.

The electrodes will be spaced laterally with 20 ft centers to prevent the formation of any cold spots and ensure optimal heating within the treatment area. The tops of the uppermost electrodes will be located at 17.9 ft BGS and the soil will be heated approximately 3 ft above this. This will allow any volatized contaminants to be captured in the vapor extraction system before they condense.

Water will be added at each electrode to promote convective heat transfer throughout the treatment volume. Each shallow electrode is equipped with a water return line - which has a spring check valve to prevent back flow - to purge water from the electrode well as needed to prevent overpressure conditions below surface.

Each of the 52 electrode wells is a triple stacked electrode well utilizing a 10 inch diameter by 10 ft long electrode and will be installed inside a 12 inch drill casing. Each electrode well will have at surface: 3 electrode wires, 3 top water injection hoses, 3 bottom water injection hoses, 1 liquid return hose and 3 electrode ropes. See Appendix B for the electrode well completion drawing #E7DC40000C016 and the electrode wellhead construction drawing #C7DC40000C008.

For the Phase IIa C-400 treatment area, 156 electrodes will be installed to heat the UCRS treatment depth from 20 to 60 ft BGS. The number of electrodes has been reduced from the 227 electrodes specified in the original Phase I C-400 SE area design, which was developed to heat a treatment depth from 20 to 100 ft BGS.

Triple stacked electrodes will be installed at all electrode wells, including at west perimeter locations where the treatment depth extends only to 40 ft BGS. This is intended to improve the phase balance of the system, resulting in more efficient ET-DSP™ operation and decreased voltage potentials at surface. This will also ensure uniform heating of the treatment volume when target temperature is achieved on the west edge of the 40 to 60 ft BGS contaminant plume.

3.2. Extraction Wells

MPE wells (X wells) extract groundwater with submersible pumps and extract vapor through the vadose zone well screen and into the vacuum lines. Each MPE well has a pneumatic pump with a 4-inch diameter bottom inlet placed 6 inches above a 3 ft long sump for liquid extraction. The vapor screen interval is from 15 to 65 ft BGS. Unlike Phase I, submersible sample pumps will not be installed in the MPE wells as

The remediation process will be operated such that water levels within the treatment area are drawn down relative to levels outside this area. This approach will ensure that groundwater flow is always directed into the treatment volume.

The hydraulic balance within the treatment area is calculated based off of an extraction to injection ratio for the site and is further broken down into the extraction rate at a given well using its pneumatic cycle counter and the injection rate of the electrodes surrounding that well. The injection rates to individual electrodes are logged into Mc2 server via the flow meter located within the WCS units. The site totalizers for extraction and overall injection are standalone units along with the cycle counters which are recorded by the on-site operator. Field data shall be forwarded to McMillan-McGee Corp. in Calgary within a timely manner of being obtained. The hydraulic data obtained from the field will be evaluated by McMillan-McGee staff to confirm that the extraction/injection ratio is being achieved as per the RDR.

Vacuum monitoring wells are designed to monitor vacuum conditions at the edge of the contaminant plume. These wells will be placed within the ROC of extraction wells such that vacuum should be detected (i.e. vacuum level below -0.1 inHg) at each vacuum monitoring well when the extraction system is operating. If vacuum conditions are not as designed, these wells could be connected to the vapor extraction system but are not designed for high flow.

To monitor the subsurface vacuum, a total of 15 vacuum gages will be used on 5 vacuum monitoring wells and 10 digiTAM™/vacuum monitoring wells.

Sensor wells are to be installed as shown in drawing #C7DC40000C005, with sensor wellheads completed as shown in drawing #C7DC40000C007. Both drawings are included in Appendix B.

3.4. Drilling Summary

Table 2 Drilling Program Details

Item	Qty	Depth (ft BGS)	Boring Diameter (inch)	Total Depth to Drill (ft)	Notes
Electrode Boreholes	52	63.65	12	3,310	Min. 12-inch diam. boring to accommodate 10-inch electrode and graphite backfill.
Multiphase Extraction Boreholes	22	68.5	8	1,507	8-inch diameter boring to accommodate 4 inch SS well screen.
Vapor Extraction Boreholes	11	50.5	8	555.5	8-inch diameter boring to accommodate 4 inch SS well screen.
Vacuum Monitoring Boreholes	5	50.5	4	252.5	4 inch diam. boring to accommodate 2-inch fiberglass (or equivalent) well casing.
DigiTAM™ Boreholes	29	68.5	6	1986.5	6 inch diam. boring to accommodate 2-inch fiberglass (or equivalent) well casing.
DigiTAM™ / Vacuum Monitoring Boreholes	10	68.5	8	685.0	8-inch diam. boring to accommodate 2 – 2-inch fiberglass (or equivalent) well casings.[2]
Totals	**129**			**8,296.5**	

3.5. Power Delivery System (PDS)

The PDS units developed and manufactured by Mc^2 are computer-controlled to deliver the proper amount of energy to individual electrodes, both laterally and vertically, thus compensating for differences in the electrical resistance of the geological units. The ET-DSP^{TM} PDS utilizes a system of time-distributed control (TDC) to control the power to the electrodes. This process effectively controls power consumption of individual electrodes. For example, should it become apparent that certain electrodes are in electrically resistive zones that may result in cold spots, the power to the electrodes can be increased in these areas to ensure uniform heating. This method controls the electrical sine wave of three-phase power to the millisecond such that each electrode can be individually manipulated. Additionally, the PDS units are equipped with a range of voltage taps to further control the heating process. This process results in heating the soil faster, more uniformly, and more efficiently than could otherwise be achieved. The PDS units are fully automated and can be accessed via the Internet for remote monitoring and adjustment.

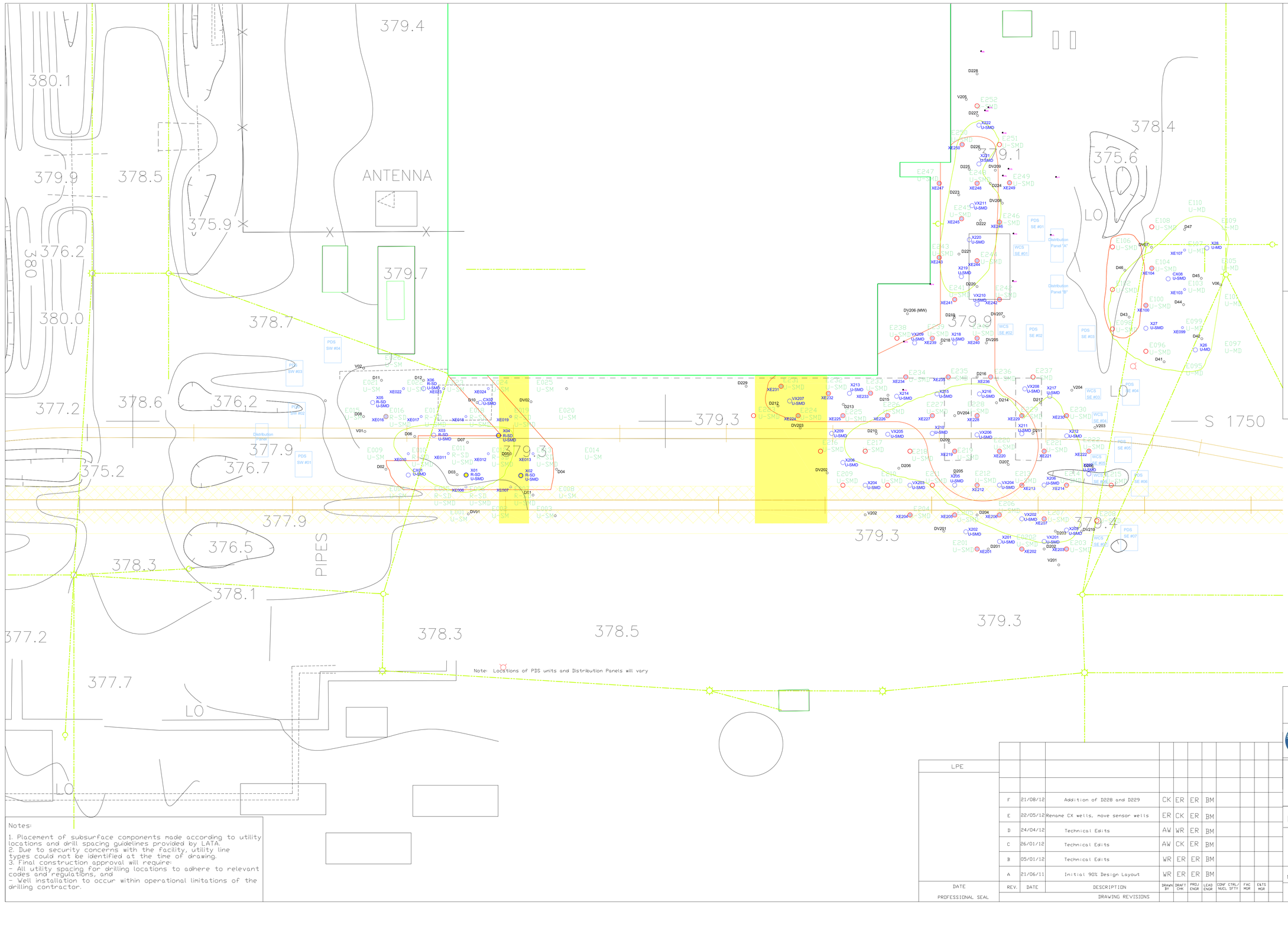
PDS units are manufactured by Mc^2 in 12, 24 or 60-electrode systems. For PGDP C-400 Phase IIa, there are two options for PDS units:

1. Option A: 7 – 24 electrode PDS units; or

[2] The MW well near the C-400 building is to be converted into a DV well giving a total of 10 DV locations.

Extraction Well Coordinates			
Well Designation	**Easting**	**Northing**	**Name**
X201	-4093.2758	-1806.4524	Extraction
X202	-4109.0642	-1801.9027	Extraction
X203	-4061.8142	-1801.1280	Extraction
X204	-4156.3142	-1780.0388	Extraction
X205	-4114.3144	-1779.9753	Extraction
X206	-4072.3144	-1779.9753	Extraction
X207	-4051.3142	-1774.7144	Extraction
X208	-4166.8142	-1769.3899	Extraction
X209	-4172.0642	-1755.7188	Extraction
X210	-4124.8231	-1755.7038	Extraction
X211	-4082.8142	-1755.8465	Extraction
X212	-4061.7363	-1756.8538	Extraction
X213	-4163.7148	-1736.8794	Extraction
X214	-4141.5551	-1738.2789	Extraction
X215	-4122.6004	-1737.1723	Extraction
X216	-4102.6874	-1737.1719	Extraction
X217	-4069.6773	-1738.2787	Extraction
X218	-4114.3146	-1713.1861	Extraction
X219	-4111.1767	-1682.0626	Extraction
X220	-4107.4445	-1664.7733	Extraction
X221	-4102.9429	-1629.1595	Extraction
X222	-4102.9429	-1610.9730	Extraction
VX201	-4072.3142	-1806.4524	Extraction
VX202	-4082.8142	-1795.8036	Extraction
VX203	-4135.3142	-1780.0388	Extraction
VX204	-4093.3144	-1779.9753	Extraction
VX205	-4145.7385	-1756.1058	Extraction
VX206	-4103.8256	-1756.3639	Extraction
VX207	-4191.8145	-1740.5068	Extraction
VX208	-4081.4148	-1734.7855	Extraction
VX209	-4133.1223	-1713.1861	Extraction
VX210	-4103.7892	-1695.0528	Extraction
VX211	-4106.1714	-1648.7572	Extraction

Data Acquisition Well Coordinates			
Well Designation	Easting	Northing	Name
D201	-4098.5642	-1809.9879	Sensor
D202	-4072.3142	-1809.9879	Sensor
D203	-4067.0642	-1801.6045	Sensor
D204	-4103.8142	-1794.0146	Sensor
D205	-4114.3144	-1774.7145	Sensor
D206	-4140.5642	-1772.0522	Sensor
D207	-4089.1814	-1770.3198	Sensor
D208	-4049.4517	-1772.0522	Sensor
D209	-4116.9651	-1759.9320	Sensor
D210	-4151.0642	-1755.7188	Sensor
D211	-4077.5642	-1755.7188	Sensor
D212	-4197.2584	-1742.7717	Sensor
D213	-4166.6329	-1742.1003	Sensor
D214	-4094.6886	-1741.3100	Sensor
D215	-4145.6416	-1737.7954	Sensor
D216	-4103.8148	-1729.1856	Sensor
D217	-4074.0563	-1741.3099	Sensor
D218	-4120.6919	-1713.4271	Sensor
D219	-4114.4500	-1701.3000	Sensor
D220	-4103.8145	-1686.7502	Sensor
D221	-4112.3121	-1671.4952	Sensor
D222	-4102.1945	-1655.6800	Sensor
D223	-4112.4022	-1643.6627	Sensor
D224	-4097.5842	-1638.3323	Sensor
D225	-4107.4681	-1631.6652	Sensor
D226	-4102.6524	-1622.2980	Sensor
D227	-4103.6020	-1606.4433	Sensor
D228	-4103.8145	-1586.8752	Sensor
D229	-4212.2258	-1733.5708	Sensor
V201	-4065.5000	-1817.4597	Sensor
V202	-4156.3728	-1793.9813	Sensor
V203	-4048.4756	-1752.9188	Sensor
V204	-4059.3244	-1735.4139	Sensor
V205	-4108.8677	-1598.8616	Sensor
DV201	-4118.5839	-1801.6045	Sensor
DV202	-4174.1932	-1774.2744	Sensor
DV203	-4186.8434	-1753.1551	Sensor
DV204	-4114.3142	-1747.3722	Sensor
DV205	-4099.4520	-1713.2138	Sensor
DV206	-4136.5000	-1699.5000	Sensor
DV207	-4091.3072	-1700.8295	Sensor
DV208	-4091.9329	-1647.5870	Sensor
DV209	-4095.2355	-1632.1063	Sensor
DV210	-4054.7017	-1801.6045	Sensor



Legend

E057 U-SMD — Electrode Well ### / UCRS Depth - U (Shallow - S, Middle - M, Deep - D)

20-60 ft Contour 3-Electrode Well

XE088 — Electrode Well w/ Upper Vapor Extraction

X18 U-SMD — Multi-phase Extraction Well

VX201 U-SMD — Vapor Extraction Well

D40 — digiTAM Temperature Sensor Well

DV04 — Vacuum Monitoring/digiTAM Well (MW) indicates combined vacuum/ digiTAM / monitoring well location

V02 — Vacuum Monitoring

SVE Treatment Contour 0-20 ft Depth

ERH Treatment Contour 20-40 ft Depth

ERH Treatment Contour 40-60 ft Depth

Notes:

1. Placement of subsurface components made according to utility locations and drill spacing guidelines provided by LATA.
2. Due to security concerns with the facility, utility line types could not be identified at the time of drawing.
3. Final construction approval will require:
- All utility spacing for drilling locations to adhere to relevant codes and regulations, and
- Well installation to occur within operational limitations of the drilling contractor.

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

LATA Environmental Services of Kentucky, LLC
managed for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC30-10CC40020 Paducah, Kentucky

McMillan-McGee Corp
CALGARY, ALBERTA CANADA
(403) 279-7948
FAX (403) 272-7201

PROJECT NAME: Paducah PGDP C-400 Remediation Project

TITLE: C-400 Complex
Plan View Layout of ET-DSP Components
PDS Option A Phase IIa

CAD FILE NAME	BUILDING	PLANT	CLASS
Mc2-Paducah-C400-ETDSP-Layout.DWG	C-400	PGDP	U
SCALE: 1' = 22'	DRAWING NUMBER C7DC40000C014		REV F

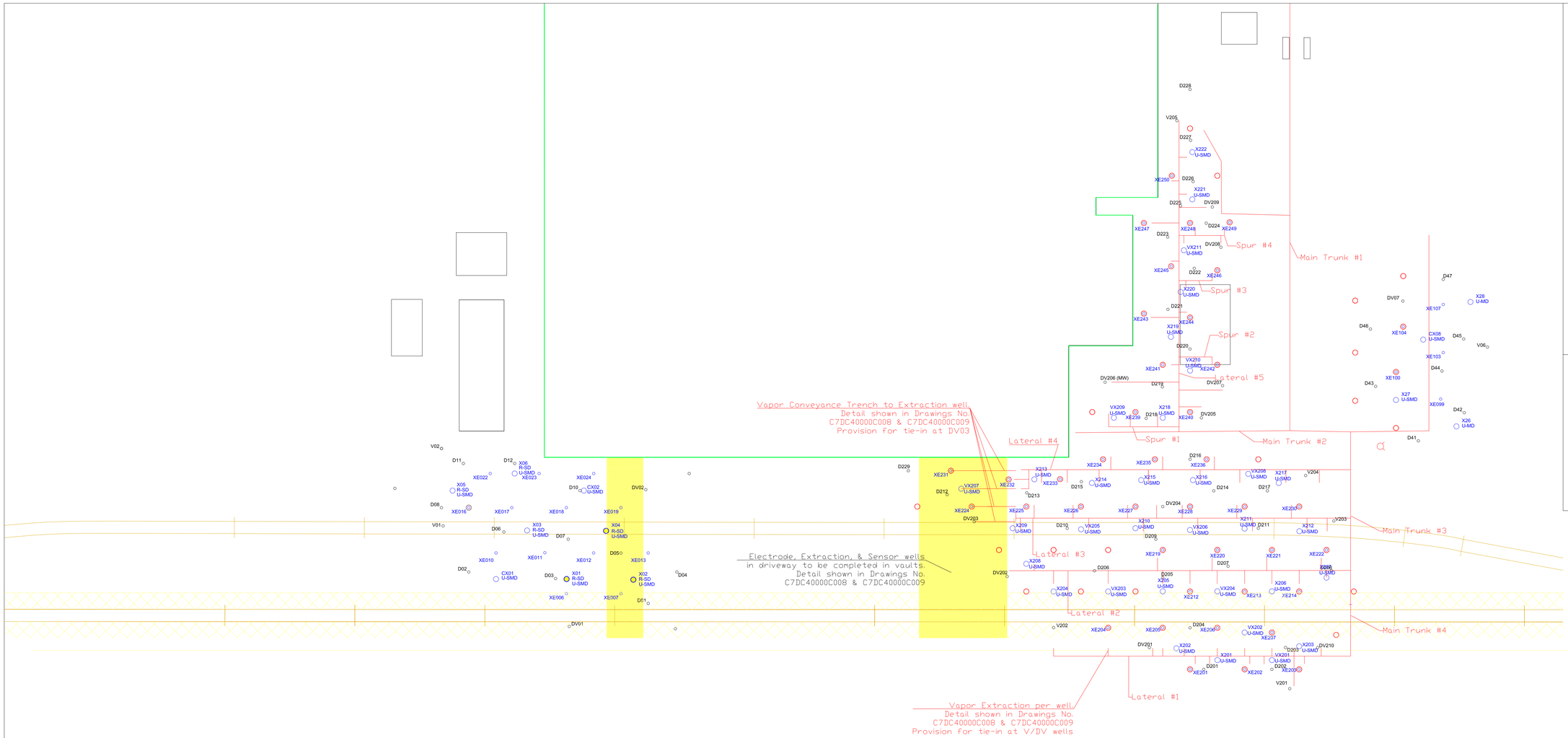
LPE

DATE

PROFESSIONAL SEAL

DRAWING REVISIONS

REV.	DATE	DESCRIPTION	DRAWN BY	DRAFT CHK	PROJ ENGR	LEAD ENGR	CONF CTRL/ NUCL SFTY	FAC MGR	E&TS MGR
F	21/08/12	Addition of D228 and D229	CK	ER	ER	BM			
E	22/05/12	Rename CX wells, move sensor wells	ER	CK	ER	BM			
D	24/04/12	Technical Edits	AW	WR	ER	BM			
C	26/01/12	Technical Edits	AW	CK	ER	BM			
B	05/01/12	Technical Edits	WR	ER	ER	BM			
A	21/06/11	Initial 90% Design Layout	WR	ER	ER	BM			



Note: Locations of PDS units and Distribution Panels will vary

Legend

Electrode Well ###
UCRS Depth - U
Shallow - S
Middle - M
Deep - D

20-60 ft Contour 3-Electrode Well

XE088 — Electrode Well w/ Upper Vapor Extraction

X18 U-SMD — Multi-phase Extraction Well

VX201 U-SMD — Vapor Extraction Well

D40 — digiTAM Temperature Sensor Well

DV04 — Vacuum Monitoring/digiTAM Well
(MW) indicates combined vacuum/ digiTAM / monitoring well location

V02 — Vacuum Monitoring

SVE Treatment Contour
0-20 ft Depth

ERH Treatment Contour
20-40 ft Depth

ERH Treatment Contour
40-60 ft Depth

Notes:

1. Placement of subsurface components made according to utility locations and drill spacing guidelines provided by LATA.
2. Due to security concerns with the facility, utility line types could not be identified at the time of drawing.
3. Final construction approval will require:
- All utility spacing for drilling locations to adhere to relevant codes and regulations, and
- Well installation to occur within operational limitations of the drilling contractor.

LPE

DATE

PROFESSIONAL SEAL

REV.	DATE	DESCRIPTION	DRAWN BY	DRAFT CHK	PROJ ENGR	LEAD ENGR	CONT CTRL/ NUCL SFTY	FAC MGR	EATS MGR
		DRAWING REVISIONS							
F	21/08/12	Addition of D228 and D229	ER	CK	ER	BM			
E	22/05/12	Rename CX wells, move sensor wells	ER	CK	ER	BM			
D	24/04/12	Technical Edits	AW	WR	ER	BM			
C	26/01/12	Technical Edits	AW	CK	ER	BM			
B	05/01/12	Technical Edits	WR	ER	ER	BM			
A	21/06/11	Initial 90% Design Layout	WR	ER	ER	BM			

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

LATA Environmental Services of Kentucky, LLC
managed for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC30-10CC40020 Paducah, Kentucky

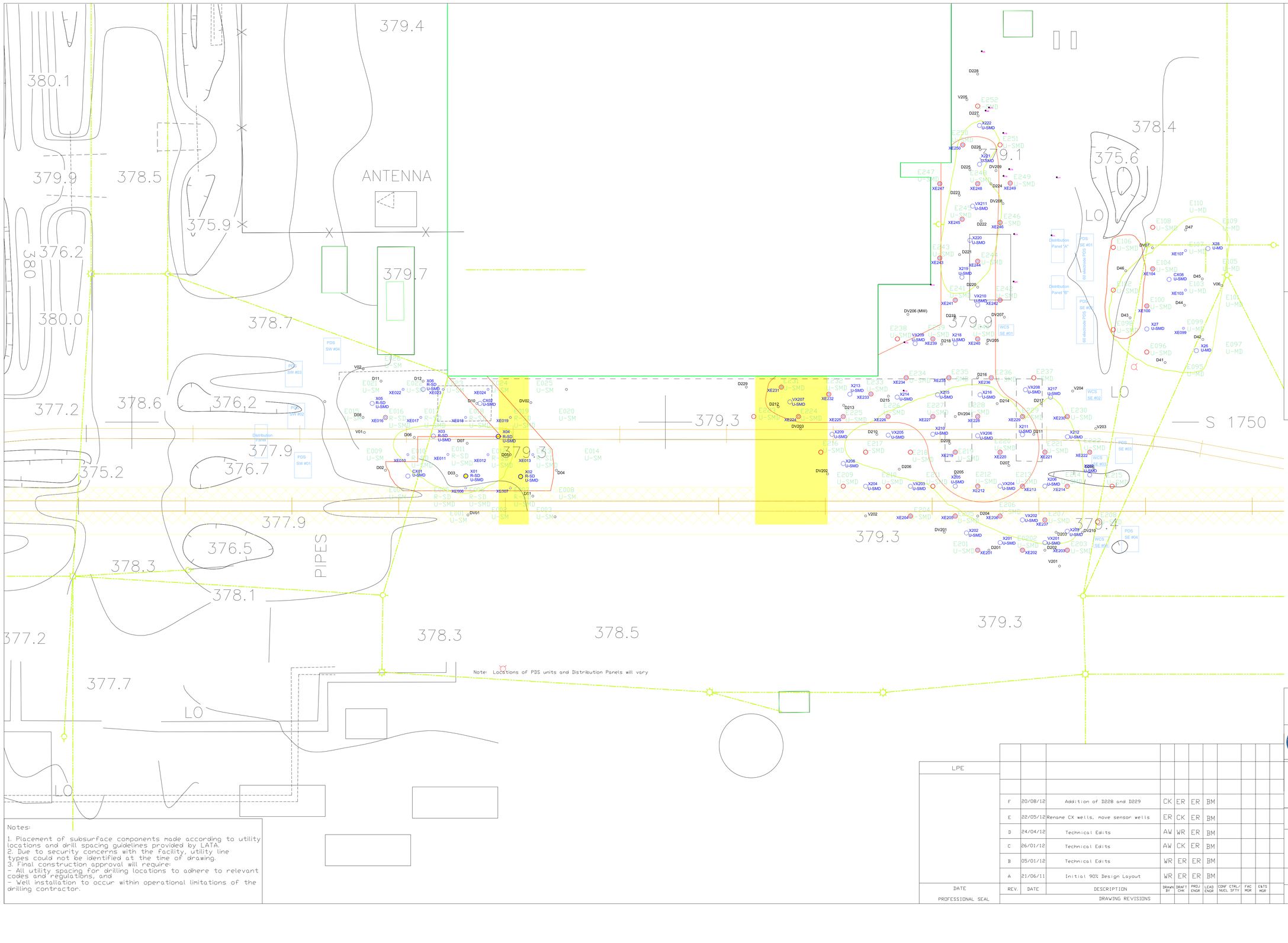
McMillan-McGee Corp
CALGARY, ALBERTA CANADA
(403) 279-7948
FAX (403) 272-7201

PROJECT NAME:
Paducah PGDP C-400 Remediation Project

TITLE:
C-400 Complex Detail Drawing
of Wellfield Connection Piping for
ET-DSP Subsurface Components Phase IIa

CAD FILE NAME	BUILDING	PLANT	CLASS
Mc2-Paducah-C400-ETDSP-Layout.DWG	C-400	PGDP	U

SCALE:	DRAWING NUMBER	REV
1' = 22'	C7DC40000C004	F



Legend

- E057 / U-SMD — Electrode Well ### / UCRS Depth - U (Shallow - S, Middle - M, Deep - D)
- 20-60 ft Contour 3-Electrode Well
- XE088 — Electrode Well w/ Upper Vapor Extraction
- X18 U-SMD — Multi-phase Extraction Well
- VX201 U-SMD — Vapor Extraction Well
- D40 — digiTAM Temperature Sensor Well
- DV04 — Vacuum Monitoring/digiTAM Well (MW) indicates combined vacuum/ digiTAM / monitoring well location
- V02 — Vacuum Monitoring

SVE Treatment Contour
0-20 ft Depth

ERH Treatment Contour
20-40 ft Depth

ERH Treatment Contour
40-60 ft Depth

Notes:

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U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

LATA Environmental Services of Kentucky, LLC
managed for the DEPARTMENT OF ENERGY under U.S. GOVERNMENT contract DE-AC30-10CC40020 Paducah, Kentucky

McMillan-McGee Corp
CALGARY, ALBERTA CANADA
(403) 279-7948
FAX (403) 272-7201

PROJECT NAME:
Paducah PGDP C-400 Remediation Project

TITLE:
C-400 Complex
Plan View Layout of ET-DSP Components
PDS Option B Phase IIa

CAD FILE NAME	BUILDING	PLANT	CLASS
Mc2-Paducah-C400-ETDSP-Layout.DWG	C-400	PGDP	U

SCALE:	DRAWING NUMBER	REV
1' = 22'	C7DC40000C015	F

LPE

DATE

PROFESSIONAL SEAL

REV.	DATE	DESCRIPTION	DRAWN BY	DRAFT CHK	PROJ ENGR	LEAD ENGR	CONF CTRL/ NUCL SFTY	FAC MGR	E&TS MGR
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