

APPENDIX A – EPA XL SCHEDULE AND SUMMARY OF MATERIALS INSTALLED

Table 1-1. Revised Project XL Delivery Schedule

Project Task	Delivery Date
<ul style="list-style-type: none"> • RWQCB approved the revised Waste Discharge Requirement Permit 	June 22, 2000
<ul style="list-style-type: none"> • Final draft FPA circulated to stakeholders for comments 	June 22, 2000
<ul style="list-style-type: none"> • Comments received for Final Project Agreement (FPA) • Instrumentation installation began 	July 3, 2000
<ul style="list-style-type: none"> • Finalize FPA and distribute for signature 	July 21, 2000
<ul style="list-style-type: none"> • All parties sign FPA document 	September, 2000
<ul style="list-style-type: none"> • Final Rule for Yolo County XL Project published in Federal Register 	August 30, 2001
<ul style="list-style-type: none"> • First lift of waste completed in the southeast corner of Module 6D. This lift of waste is to be used as the foundation layer for the aerobic cell liner. 	January 2001
<ul style="list-style-type: none"> • Waste placement begins in the northeast 3.5 acre anaerobic bioreactor 	January 2001
<ul style="list-style-type: none"> • Begin monitoring temperature and moisture of waste 	January 2001
<ul style="list-style-type: none"> • Begin waste placement in west 6-acre anaerobic cell (waste placement alternates between the west and northeast anaerobic bioreactors and the aerobic bioreactor to facilitate placement of instrumentation, piping, etc.) 	March 2001
<ul style="list-style-type: none"> • Completed construction of aerobic cell liner and begin waste placement in aerobic cell 	July 2001
<ul style="list-style-type: none"> • Complete the following for the northeast anaerobic 3.5-acre cell: waste placement, instrumentation, leachate injection system, air injection system, and gas and leachate monitoring 	September 2001
<ul style="list-style-type: none"> • Complete the following for the aerobic bioreactor: waste placement, instrumentation, data acquisition and control system, leachate injection system, air management system, gas and leachate monitoring 	June 2003
<ul style="list-style-type: none"> • Begin liquid addition to the northeast 3.5-acre anaerobic cell 	November 2001
<ul style="list-style-type: none"> • Begin liquid addition and air injection in aerobic bioreactor 	June 2003
<ul style="list-style-type: none"> • Complete the following for the west anaerobic 6-acre cell: waste placement, instrumentation, data acquisition and control system, leachate injection system, gas collection system, gas and leachate monitoring, and cover system 	October 2002
<ul style="list-style-type: none"> • Begin liquid injection in the west side 6-acre anaerobic bioreactor 	June 2003
<ul style="list-style-type: none"> • Data collection and reporting will continue 	On-going until waste stabilization is complete, but dependent on sustained funding levels

Table 3-1. Summary of Data for the Northeast Anaerobic Cell

Description	Data
Footprint	3.4 acres
Average Waste Depth	35 feet
Construction of the Base Liner	1999
Waste Filling of Cells	1/13/2001 – 8/3/2001
Total # of Waste Lifts	4
Total Amount of Waste	65,104 tons
Total Amount of Greenwaste ADC ¹	11,060 tons
Volume of Soil Within the Waste Mass ²	5,970 cubic yards
As-Placed Biodegradable Waste Tonnage ³	29,600 tons
As-Placed Biodegradable Greenwaste ADC Tonnage ³	7,700 tons
Ratio of Waste to Greenwaste ADC	5.9 to 1
Ratio of Waste to Greenwaste ADC and Soil	3.4 to 1
Average Density of Waste	1,162 pounds per cubic yard, lbs/cy (does not include soil or ADC)
Total # of Horizontal Gas Collection Lines ⁴	17 Spacing of approximately 40 feet on center
Layer 1	6
Layer 2	5
Layer 3	3
Layer 4	3
Total # of Liquid Addition Lines (HDPE Pipe) ⁵	25 Spacing of approximately 40 feet on center
Layer 1	8
Layer 2	7
Layer 3	5
Layer 4	5
Total Amount of Liquid Addition Piping	7,990 feet
Layer 1	3,080 feet
Layer 2	2,450 feet
Layer 3	1,500 feet
Layer 4	960 feet
Total # of 3/32 inch Diameter Holes in Injection Line	337
Layer 1	145
Layer 2	93
Layer 3	55
Layer 4	44
Surface Liner	36-mil ⁶ Reinforced Polypropylene

¹ADC-Alternative Daily Cover

²This is an estimate

³Calculated using biodegradable fractions from Tchobanoglous et, al. (1993)

⁴Refer to Table 3 for a complete description of gas collection lines

⁵High Density Polyethylene, HDPE

⁶1-mil is equivalent to 0.001 inches and refers to the thickness of the liner

Table 3-2. Summary of Sensors for the Anaerobic Cells

Type of Instrumentation	FPA Proposed Location/Quantity/Spacing	Northeast Anaerobic Cell Actual Location/Quantity/Spacing	West-Side Anaerobic Cell Actual Location/Quantity/Spacing
<i>Bubbler Gage for Liquid/Gas Pressure Measurement and Liquid/Gas Sampling</i>	<ol style="list-style-type: none"> 1. Top of the first lift of waste- 55 gages 2. Top of the second lift of waste-40 gages 3. Top of the third lift of waste-30 gages 4. Top of the final lift of waste-20 gages <p>TOTAL= 145 gages</p>	<ol style="list-style-type: none"> 1. Top of the first lift of waste- 15 gages at 75 feet spacing 2. Top of the second lift of waste-13 gages at 75 feet spacing 3. Top of the third lift of waste- 13 gages at 75 feet spacing 4. Top of the final lift of waste- no gages <p>TOTAL= 41 gages</p>	<ol style="list-style-type: none"> 1. Top of the first lift of waste- 6 gages at various spacing 2. Top of the second lift of waste-7 gages at various spacings 3. Top of the third lift of waste- no gages 4. Top of the final lift of waste- no gages <p>TOTAL= 13</p>
<i>Moisture and Temperature Sensors</i>	<ol style="list-style-type: none"> 1. Top of the first lift of waste-55 temperature and moisture sensors 2. Top of the second lift of waste-40 temperature and moisture sensors 3. Top of the third lift of waste-30 temperature and moisture sensors 4. Top of the final lift of waste-20 temperature sensors <p>TOTAL= 145 temperature sensors and 125 moisture sensors</p>	<ol style="list-style-type: none"> 1. Top of the first lift of waste-18 temperature and 18 moisture sensors at 75 feet spacing 2. Top of the second lift of waste-16 temperature and 39 moisture sensors at 75 feet spacing 3. Top of the third lift of waste-13 temperature and 13 moisture sensors at 75 feet spacing 4. Top of the final lift of waste- no sensors <p>TOTAL= 47 temperature sensors and 70 moisture sensors</p>	<ol style="list-style-type: none"> 1. Top of the first lift of waste-6 temperature and 6 moisture sensors at various spacings 2. Top of the second lift of waste-43 temperature and 43 moisture sensors at various spacings 3. Top of the third lift of waste-14 temperature and 14 moisture sensors at various spacings 4. Top of the final lift of waste- no sensors <p>TOTAL= 63 temperature sensors and 63 moisture sensors</p>

Because the original project was altered from constructing one 9.5-acre anaerobic cell to constructing two anaerobic cells, one occupying 6-acres and one occupying 3.5-acres, waste placement area was lost in the valley separating the two anaerobic cells. This resulted in the installation of fewer sensors over the 9.5-acre area than initially proposed.

Table 3-3. Summary of Gas Collection Lines for the Northeast Anaerobic Cell

Gas Collection Line¹	Description	Spacing
1-G1	Alternating 4 and 6 inch schedule 80 PVC ² .	50' from west toe
1-G2	Shredded tires with pipe at ends. The north end is 40 feet of schedule 40 PVC with a 10 foot section of 3 inch perforated schedule 80 PVC. The south end is 40 feet of 4 inch schedule 80 PVC, 5 feet of 3 inch schedule 80 PVC, and 10 feet of perforated HDPE.	40' from 1-G1-NE
1-G3	Alternating 4 and 6 inch schedule 80 PVC.	40' from 1-G2-NE
1-G4	Shredded tires with PVC pipe at ends. The south end is 40 feet of 4 inch schedule 80 PVC and 10 feet of 6 inch schedule 80 PVC. The north end is 40 feet of 4 inch schedule 40 PVC.	40' from 1-G3-NE
1-G5	Shredded tires with PVC pipes at ends. The south end is 40 feet of 4 inch schedule 80 PVC, 10 feet of 6 inch schedule 80 PVC, 20 feet of 4 inch schedule 80 PVC, and 5 feet of 24 inch corrugated HDPE. The north end is 40 feet of 4 inch schedule 40 PVC.	40' from 1-G4-NE
1-G6	Shredded tires with PVC pipes at ends. The south end is 40 feet of 4 inch schedule 80 PVC, 20 feet of 3 inch perforated schedule 80 PVC, 10 feet of 6 inch schedule 80, and 20 feet of 3 inch perforated schedule 80 PVC. The north end is 40 feet of 4 inch schedule 40 PVC.	40' from 1-G5-NE
2-G1	Shredded tires with PVC pipes at ends. The south end is 40 feet of 4 inch schedule 80, 10 feet of 6 inch schedule 80, and 10 feet of 4 inch schedule 80 PVC. The north end is 40 feet of 4 inch schedule 40 PVC.	30' from West toe
2-G2	Alternating 4 and 6 inch schedule 80 PVC pipe for the entire length with 40 feet of 4 inch at the north and south end.	40' from 2-G1-NE
2-G3	Shredded tires with PVC pipe at the ends. The north end is 40 feet of 4 inch schedule 40 PVC. The south end 40 feet of 4 inch schedule 80 PVC, 20 feet of 3 inch schedule 80 PVC, 10 feet of 6 inch schedule 80 PVC, and 20 feet 3 inch perforated schedule 80 PVC.	40' from 2-G2-NE
2-G4	Alternating 6 and 3 inch schedule 80 PVC pipe. The south end is 4 inch schedule 80 PVC and the north end is 4 inch schedule 40 PVC.	40' from 2-G3-NE
2-G5	Shredded tires with pipe at the ends. The north end is 40 feet of 4 inch schedule 40 PVC. The south end is 40 feet of 4 inch schedule 80 PVC, 20 feet of 3 inch schedule 80 PVC, 20 feet of 4 inch schedule 80 PVC, and 10 feet of 12 inch corrugated HDPE ³ .	40' from 2-G4-NE
3-G1	Shredded tires with PVC pipe at the ends. The north end is 40 feet of 4 inch schedule 40 PVC. The south end is 40 feet 4 inch schedule 80 and 20 feet of 8 inch schedule 40.	45' from west toe
3-G2	Shredded tires with PVC pipe at the ends. The north end is 40 feet of 4 inch schedule 40 VC. The south end is 40 feet of 4 inch schedule 80 PVC, 20 feet of 8 inch HDPE, and 40 feet of 6 inch HDPE.	45' from 3-G1-NE
3-G3	Shredded tires with PVC pipe at the ends. The north end is 40 feet of 4 inch schedule 40 PVC. The south end is 40 feet of 4 inch schedule 80 PVC, 20 feet of 6 inch schedule 40 PVC, and 10 feet of 12 inch corrugated HDPE.	35' from 3-G2-NE

¹Gas Collection Line Nomenclature: Layer # - G (for gas) and gas line #

²Polyvinyl chloride, PVC

³High Density Polyethylene, HDPE

Table 4-1. Summary of Data for the West-Side Anaerobic Cell

Description	Data
Footprint	6 acres
Average Waste Depth	35 feet
Construction of the Base Liner	1999
Waste Filling of Cells	3/8/2001 – 8/31/2002
Total # of Waste Lifts	4
Total Amount of Waste	166,294 tons
Total Amount of Greenwaste ADC ¹	27,570 tons
Total # of Horizontal Gas Collection Lines ²	18 Spacing of approximately
Layer 1	0 80 feet on center
Layer 2	9 (Layer 4 spacing of
Layer 3	7 approximately 50 feet)
Layer 4	2
Total # of Liquid Addition Lines (HDPE Pipe) ³	27 Spacings vary
Layer 1	0
Layer 2	17
Layer 3	7
Layer 4	3
Total Amount of Liquid Addition Piping	7,185 feet
Layer 1	0 feet
Layer 2	4,350 feet
Layer 3	1,185 feet
Layer 4	1,650 feet
Total # of 3/32 and 1/8 inch Diameter Holes in Injection Line	321
Layer 1	0
Layer 2	122
Layer 3	62
Layer 4	137
Surface Liner	40-mil ⁴ LLDPE ⁵ geomembrane

¹ADC-Alternative Daily Cover

²Refer to Table 3 for a complete description of gas collection lines

³High Density Polyethylene, HDPE

⁴1-mil is equivalent to 0.001 inches and refers to the thickness of the liner

⁵Linear Low Density Polypropylene

Table 4-2. Summary of Gas Collection Lines for the West-Side Anaerobic Cell

Gas Collection Line ¹	Description	Spacing
2-G1	Shredded tires with pipe at ends. The east end is 45 feet of 4 inch schedule 80 PVC ² , 10 feet of 6 inch schedule 80 PVC, and 10 feet of 4 inch schedule 80 PVC. The west end is 50 feet of 4 inch schedule 80 PVC, 10 feet of 6 inch schedule 80 PVC, and 10 feet of 4 inch schedule 80 PVC.	80' from 2-G2
2-G2	Shredded tires with pipe at ends. The east end is 40 feet of 4 inch schedule 40 PVC, 10 feet of 6 inch schedule 80 PVC, and 10 feet of 4 inch schedule 80 PVC. The west end is 40 feet of 4 inch schedule 40 PVC, 10 feet of 6 inch schedule 80 PVC, and 10 feet of 4 inch schedule 80 PVC.	80' from 2-G3
2-G3	Shredded tires with pipe on ends. The east and west ends are 40 feet of 4 inch schedule 80 PVC, 10 feet of 6 inch schedule 80 PVC, 10 feet of 4 inch schedule 80 PVC, 10 feet of 6 inch schedule 80 PVC, and 10 feet of 4 inch schedule 80 PVC.	80' from 2-G4
2-G4	Shredded tires with pipe on ends. The east end is 20 feet of 4 inch schedule 80 PVC, 10 feet of 6 inch schedule 80 PVC, 10 feet of 4 inch schedule 80 PVC, 10 feet of 6 inch schedule 80 PVC, and 10 feet of 4 inch schedule 80 PVC. The west end is 20 feet of 4 inch schedule 80 PVC, 10 feet of 6 inch schedule 80 PVC, 10 feet of 4 inch schedule 80 PVC, 10 feet of 6 inch schedule 80 PVC, 10 feet of 4 inch schedule 80 PVC, and 20 feet of 24 inch corrugated metal pipe.	80' from 2-G5
2-G5	Alternating 10-foot lengths of 4 inch schedule 40 electrical conduit and 6 inch corrugated metal. The east end is 40 feet of 4 inch schedule 40 PVC, 10 feet of 6 inch schedule 80 PVC, and 10 feet of 4 inch schedule 80 PVC. The west end is 40 feet of schedule 80 PVC and 10 feet of 6 inch schedule 40 electrical conduit.	80' from 2-G6
2-G6	Shredded tires with pipe at ends. The east end is 40 feet of 4 inch schedule 40 PVC, 10 feet of 6 inch schedule 80 PVC, and 10 feet of 4 inch schedule 80 PVC. The west end is 40 feet of 4 inch schedule 40 PVC, 10 feet of 12 inch schedule 40 PVC, 10 feet of 4 inch schedule 80 PVC, 10 feet of 12 inch schedule 40 PVC, and 10 feet of 4 inch schedule 80 PVC.	80' from 2-G7
2-G7	Shredded tires with pipe on ends. The east end is 40 feet of 4 inch schedule 40 PVC, 10 feet of 6 inch schedule 80 PVC, and 10 feet of 4 inch schedule 80 PVC. The west end is 40 feet of 4 inch schedule 80 PVC, 10 feet of 6 inch schedule 80 PVC, and six sets of alternating 10 foot lengths of 4 inch schedule 80 PVC telescoped with 12 inch schedule 40 PVC.	80' from 2-G8
2-G8	Same as 2-G2	80' from 2-G9
2-G9	Same as 2-G2	40' from south toe
3-G1	Shredded tires with pipe on west end. No pipe on east end. The west end is 40 feet of 4 inch schedule 80 PVC, and three sets of alternating 10 foot lengths of 6 inch schedule 80 PVC telescoped with 4 inch schedule 80 PVC.	80' from 3-G2
3-G2	Same as 3-G1	80' from 3-G3
3-G3	Same as 3-G1	80' from 3-G4
3-G4	Same as 3-G1	80' from 3-G5
3-G5	Same as 3-G1	80' from 3-G6
3-G6	Shredded tires with pipe on west end. No pipe on east end. The west end is 50 feet of 4 inch schedule 80 PVC, and 60 feet of alternating 10 foot lengths of 6 inch and 4 inch schedule 80 PVC.	80' from 3-G7
3-G7	Same as 3-G1	40' from south toe
4-G1	Shredded tires with pipe on ends. The north and south ends are 3 sets of alternating 10 foot lengths of 6 inch schedule 80 PVC and 6 inch schedule 40 PVC, and one additional 10 foot length of 6 inch schedule 80 PVC.	40' from south toe
4-G2	Same as 4-G1	50' from 4-G1

¹Gas Collection Line Nomenclature: Layer #-G (for gas) and line #

²Polyvinyl chloride, PVC

Table 5-1. Summary of Data for the Aerobic Cell

Description	Data
Footprint	2.3 acres
Average Waste Depth	30 feet
Construction of the Base Liner	August 2001
Waste Filling of Cells	8/8/2001 – 9/26/2001
Total # of Waste Lifts	3
Total Amount of Waste	11,942 tons
Total Amount of Greenwaste ADC ¹	2,169 tons
Total # of Corrugated Metal Pipe Horizontal Air Collection Lines	6 Spacings vary.
Layer 1	3
Layer 2	3
Total # of CPVC ² Pipe Horizontal Air Collection Lines	5 Spacings vary.
Layer 1	3
Layer 2	2
Total Amount of Air Collection Lines ³	1,660 feet
Layer 1	1,100 feet
Layer 2	560 feet
Total # of HDPE ⁴ Pipe Liquid Addition Lines	21 Spacings approximately
Layer 1	10 40 feet on center to
Layer 2	8 alternate with CPVC pipe
Layer 3	3 for liquid addition lines.
Total # of CPVC Pipe Liquid Addition Lines	11 Spacings of approximately
Layer 1	6 40 feet on center to alternate
Layer 2	5 with HDPE pipe
	for liquid addition lines.
Total Amount of Liquid Addition Piping	4,780 feet
Layer 1	2,870 feet
Layer 2	1,400 feet
Layer 3	510 feet
Total # of 3/32 inch Diameter Holes in Injection Lines	326
Layer 1	186
Layer 2	97
Layer 3	43

¹ADC-Alternative Daily Cover

²Chlorinated Polyvinyl Chloride, CPVC

³Refer to table A for a complete description of air collection lines

⁴High Density Polyethylene, HDPE

Table 5-2. Summary of Sensors for the Aerobic Cell

Type of Instrumentation	FPA Proposed Location/Quantity/Spacing	Aerobic Cell Actual Location/Quantity/Spacing
<i>Pressure Transducers</i>	<ol style="list-style-type: none"> Two over the primary liner at 200 feet spacing One within the leachate collection sump 	<ol style="list-style-type: none"> Two over the primary liner at 200 feet spacing One within the leachate collection sump
<i>Bubbler Gage for Liquid/Gas Pressure Measurement and Liquid/Gas Sampling</i>	<ol style="list-style-type: none"> Top of the aerobic bottom liner-48 gages at 50 feet spacing Top of the first lift of waste- 24 gages Top of the second lift of waste-20 gages Top of the final lift of waste-20 gages <p>TOTAL= 112 gages</p>	<ol style="list-style-type: none"> Top of the aerobic bottom liner-12 gages at 75 feet spacing Top of the first lift of waste- 26 gages Top of the second lift of waste- 16 gages Top of the final lift of waste- no gages <p>TOTAL= 54 gages</p>
<i>Moisture and Temperature Sensors</i>	<ol style="list-style-type: none"> Top of the aerobic bottom liner-48 temperature and 12 moisture sensors Between bottom liner and the top of the first lift of waste- no sensors Top of the first lift of waste- 24 temperature and moisture sensors Top of the second lift of waste-20 temperature and moisture sensors Top of the final lift of waste-20 temperature and moisture sensors 	<ol style="list-style-type: none"> Top of the aerobic bottom liner-12 temperature and 2 moisture sensors at 75 feet spacing Between bottom liner and the top of the first lift of waste- 3 temperature sensors and 3 moisture sensors at various spacings. Top of the first lift of waste- 26 temperature and 26 moisture sensors at various spacings Top of the second lift of waste-18 temperature and 21 moisture sensors at various spacings Top of the final lift of waste-no temperature or moisture sensors
	TOTAL= 112 temperature sensors and 76 moisture sensors	TOTAL= 59 temperature sensors and 52 moisture sensors

Table 5-3. Summary of Air Collection Lines for the Aerobic Cell

Air Collection Line¹	Description	Spacing
1-A1	Alternating 10 foot lengths of 4 and 6 inch schedule 80 CPVC ² .	30' from west toe
1-A2	Alternating 10 foot lengths of 6 and 8 inch corrugated metal pipe.	40' from 1-A1-SE
1-A3	Alternating 10 foot lengths of 6 and 8 inch corrugated metal pipe.	40' from 1-A2-SE
1-A4	Alternating 10 foot lengths of 4 and 6 inch schedule 80 CPVC.	40' from 1-A3-SE
1-A5	Alternating 10 foot lengths of 6 and 8 inch corrugated metal pipe.	40' from 1-A4-SE
1-A6	Alternating 10 foot lengths of 4 and 6 inch schedule 80 CPVC.	40' from 1-A5-SE
2-A1	Alternating 10 foot lengths of 6 and 8 inch corrugated metal pipe.	25' from west toe
2-A2	Alternating 10 foot lengths of 4 and 6 inch schedule 80 CPVC.	40' from 2-A1-SE
2-A3	Alternating 10 foot lengths of 6 and 8 inch corrugated metal pipe.	40' from 2-A2-SE
2-A4	Alternating 10 foot lengths of 4 and 6 inch schedule 80 CPVC.	40' from 2-A3-SE
2-A5	Alternating 10 foot lengths of 6 and 8 inch corrugated metal pipe.	40' from 2-A4-SE

¹Air Collection Line Nomenclature: Layer # - A (for air) and air collection line #

²Chlorinated Polyvinyl Chloride, PVC

Table 6-1. Summary of Sensors for the Module 6D Base Liner

Type of Instrumentation	FPA Proposed Location/Quantity/Spacing	Module 6D Base Liner Actual Location/Quantity/Spacing
<i>Pressure Transducer</i>	<ol style="list-style-type: none"> Eight over the primary liner near the LCRS trench at 200 feet spacing Two over the primary liner within the leachate collection sumps 	<ol style="list-style-type: none"> Six over the primary liner at 200 feet spacing (three near the west LCRS and three near the east LCRS) Four over the primary liner within the leachate collection sumps
<i>Bubbler Gage for Liquid/Gas Pressure Measurement and Liquid/Gas Sampling</i>	Top of primary bottom liner-66 gages at 75 feet spacing	Top of primary bottom liner-66 gages at 75 feet spacing
<i>Moisture and Temperature Sensors</i>	Top of primary bottom liner-66 temperature sensors at 75 feet spacing and 12 moisture sensors	Top of primary bottom liner-66 temperature sensors at 75 feet spacing and 12 moisture sensors