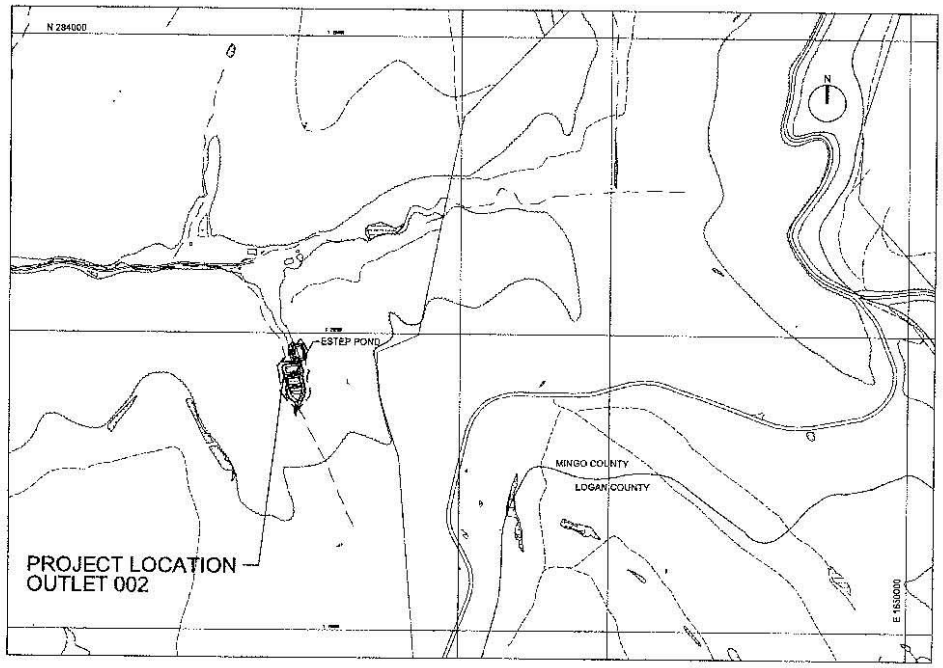
ATTACHMENT 1 TO APPENDIX C

OUTLET 002
SELENIUM PASSIVE TREATMENT SYSTEM
COAL - MAC INC.
HOLDEN, WEST VIRGINIA

VICINITY MAP



PROJECT LOCATION MAP

INDEX TO DRAWINGS

GENERAL

DWG No.	DESCRIPTION
G-01	COVER SHEET
G-02	LEGEND AND GENERAL NOTES
G-03	OVERALL SITE PLAN / SITE ACCESS

CIVIL

DWG No.	DESCRIPTION
C-01	SITE LAYOUT TREATMENT CELLS PLAN AND PROFILE
C-02	CELL LAYOUT
C-03	CELL PIPING PLAN
C-04	GRADING AND EROSION CONTROL PLAN
C-05	CELL GRADING PLAN
C-06	SITE AND PIPING SPECIFICATION SHEET
C-07	ENLARGED PIPING PLANS AND SECTIONS
C-08	ENLARGED PIPING PLANS AND SECTIONS
C-09	PIPING SECTIONS AND DETAILS
C-10	TREATMENT CELL SECTIONS
C-11	BERM AND SPILLWAY SECTIONS
C-12	LINER DETAILS
C-13	SITE DETAILS
C-14	SITE DETAILS

NO	DATE	DESCRIPTION	APVR	N
NO	DATE	REVISION	BY	APVD

DESIGN | CHK | APPROVED

OUTLET 002
SELENIUM PASSIVE TREATMENT SYSTEM
COAL - MAC, INC.

CH2MHILL

CIVIL
COVER SHEET

SHOWN
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	OCTOBER 2010
PROJ	408527
DWG	G-01
SHEET	

PRELIMINARY

FILENAME: 000-G-0001_408527.dgPLOT DATE: 10/22/2010 PLOT TIME: 10:34:49 AM

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GENERAL SITE NOTES:

1. SOURCE OF TOPOGRAPHY SHOWN ON THE CIVIL PLANS ARE BASE MAPS PROVIDED BY COAL MAC INC. EXISTING CONDITIONS MAY VARY FROM THOSE SHOWN ON THESE PLANS. THE CONTRACTOR SHALL VERIFY EXISTING CONDITIONS AND ADJUST WORK PLAN ACCORDINGLY PRIOR TO BEGINNING CONSTRUCTION.
2. EXISTING TOPOGRAPHY, STRUCTURES, AND SITE FEATURES ARE SHOWN SCREENED AND/OR LIGHT-LINED. NEW FINISH GRADE, STRUCTURES, AND SITE FEATURES ARE SHOWN HEAVY-LINED.
3. HORIZONTAL DATUM: STATE PLANE WEST VIRGINIA SOUTH NAD 83.
4. VERTICAL DATUM: NAVD 88.
5. MAINTAIN, RELOCATE, OR REPLACE EXISTING SURVEY MONUMENTS, CONTROL POINTS, AND STAKES WHICH ARE DISTURBED OR DESTROYED. PERFORM THE WORK TO PRODUCE THE SAME LEVEL OF ACCURACY AS THE ORIGINAL MONUMENT(S) IN A TIMELY MANNER, AND AT THE CONTRACTOR'S EXPENSE.
6. STAGING AREA SHALL BE FOR CONTRACTOR'S EMPLOYEE PARKING, CONTRACTOR'S TRAILERS AND ON-SITE STORAGE OF MATERIALS.
7. PROVIDE TEMPORARY FENCING AS NECESSARY TO MAINTAIN SECURITY AT ALL TIMES.
8. ELEVATIONS GIVEN ARE TO FINISH GRADE UNLESS OTHERWISE SHOWN.
9. SLOPE UNIFORMLY BETWEEN CONTOURS AND SPOT ELEVATIONS SHOWN.
10. ALL DISTURBED AREAS NOT RECEIVING A HARD SURFACE SHALL BE COVERED WITH GRASS.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING AND MAINTAINING EROSION CONTROL DEVICES DURING CONSTRUCTION. EROSION CONTROL DEVICES ON SHEET C-4 ARE THE MINIMUM REQUIRED.
12. CONTRACTOR SHALL TAKE ALL OTHER MEASURES TO POSITIVELY PRECLUDE EROSION MATERIALS FROM LEAVING THE SITE. CONTRACTOR TO SUBMIT EROSION CONTROL PLAN.

GENERAL YARD PIPING AND UTILITIES NOTES:

1. EXISTING UNDERGROUND UTILITIES OBTAINED FROM AS-BUILTS AND FROM FIELD SURVEY. CONTRACTOR SHALL FIELD VERIFY DEPTH AND LOCATION PRIOR TO EXCAVATION. PROTECT ALL EXISTING UTILITIES DURING CONSTRUCTION.
2. EXISTING PIPING AND EQUIPMENT ARE SHOWN SCREENED AND/OR LIGHT-LINED. NEW PIPING AND EQUIPMENT ARE SHOWN HEAVY-LINED.
3. ALL PIPES SHALL HAVE A CONSTANT SLOPE BETWEEN INVERT ELEVATIONS UNLESS A FITTING IS SHOWN.

GENERAL NOTE:

1. THIS IS A STANDARD LEGEND SHEET. THEREFORE, NOT ALL OF THE INFORMATION SHOWN MAY BE USED ON THIS PROJECT.

CIVIL LEGEND

EXISTING	THIS CONTRACT	
157.7	168.5	SPOT ELEVATION
155	155	CONTOUR LINE
	3:1	EMBANKMENT AND SLOPE
		DRAINAGEWAY OR DITCH
		CATCH BASIN OR INLET
		TRENCH DRAIN
	OR	SIGN
		MANHOLE
		ELECTRICAL MANHOLE
		ELECTRIC HANDHOLE
		POST OR GUARD POST
		GUY ANCHOR
		FIRE HYDRANT
		UTILITY POLE
		LIGHT POLE
		BENCH MARK
		SURVEY CONTROL POINT OR POINT OF INTERSECTION
		BRUSH/TREE LINE
		TREE
		PROPERTY LINE
		CENTER LINE, BUILDING, ROAD, ETC.
		STAGING OR WORK AREA LIMITS
	N 1000.00 E 1000.00	STRUCTURE, BUILDING OR FACILITY LOCATION POINT - COORDINATES
	B-1	BORING LOCATION AND NUMBER
	TP-2	TEST PIT LOCATION AND NUMBER
	P-3	PIEZOMETER LOCATION AND NUMBER
OR	OR	DEMOLITION
OR	OR	STRUCTURE, BUILDING OR FACILITY
		ASPHALT CONCRETE PAVEMENT
		GRAVEL SURFACING
		CONCRETE PAVEMENT
		CURB
		CURB AND GUTTER
		SINGLE SWING GATE
		DOUBLE SWING GATE
		SLIDING GATE
		GUARD RAIL
		CHAIN LINK FENCE
		ARCHITECTURAL FENCE
		WIRE FENCE
		CULVERT

YARD PIPING LEGEND

EXISTING	THIS CONTRACT	
8" PE	8" PE	NOMINAL PIPE DIAMETER; PIPE USE IDENTIFICATION
		PIPING < 30" DIAMETER
		PIPING ≥ 30" DIAMETER
		EXISTING PIPE TO BE ABANDONED
		EXISTING PIPE TO BE REMOVED
		NON-FREEZE HOSE VALVE (V-X) X = NO. IN SPECIFICATIONS
		NON-FREEZE HOSE VALVE WITH HOSE RACK (V-X) X = NO. IN SPECIFICATIONS
		INDICATOR POST VALVE
		GATE VALVE AND VALVE BOX
		BUTTERFLY VALVE AND VALVE BOX
		PLUG VALVE AND VALVE BOX
		FLEXIBLE COUPLING
		90° ELBOW UP
		90° ELBOW DOWN
		BEND < 90° UP
		BEND < 90° DOWN
		CONCENTRIC REDUCER
		CAP OR PLUG
		CLEANOUT
		FIRE HYDRANT
		AGRIDRAIN

EROSION CONTROL LEGEND

COVER PRACTICES	SYMBOL
TEMPORARY SEEDING	TS
MULCHING AND MATTING	ML
CLEAR PLASTIC COVERING	CPC
BUFFER ZONES	BZ
PERMANENT SEEDING AND PLANTING	PS
CONSTRUCTION ENTRANCE	
INTERCEPTOR DIKE	ID
INTERCEPTOR SWALE	IS
CHECK DAMS	
OUTLET PROTECTION / RIPRAP	
FILTER FENCE	
HAY / STRAW BALE BARRIER (BIOFILTER)	
SEDIMENT TRAP (OR SUMP)	
SEDIMENT POND OR BASIN	

NO.	DATE	DATE	DESCRIPTION	BY	APVD	N
			REVISION			

Case 2:11-cv-00133 Document 1-2 Filed 03/24/11 Page 3 of 7 PageID #: 162

CH2MHILL

OUTLET 002
SELENIUM PASSIVE TREATMENT SYSTEM
COAL - MAC, INC.

CIVIL
LEGEND AND GENERAL NOTES

NONE
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"

DATE	OCTOBER 2010
PROJ	408527
DWG	G-02
SHEET	2

PRELIMINARY

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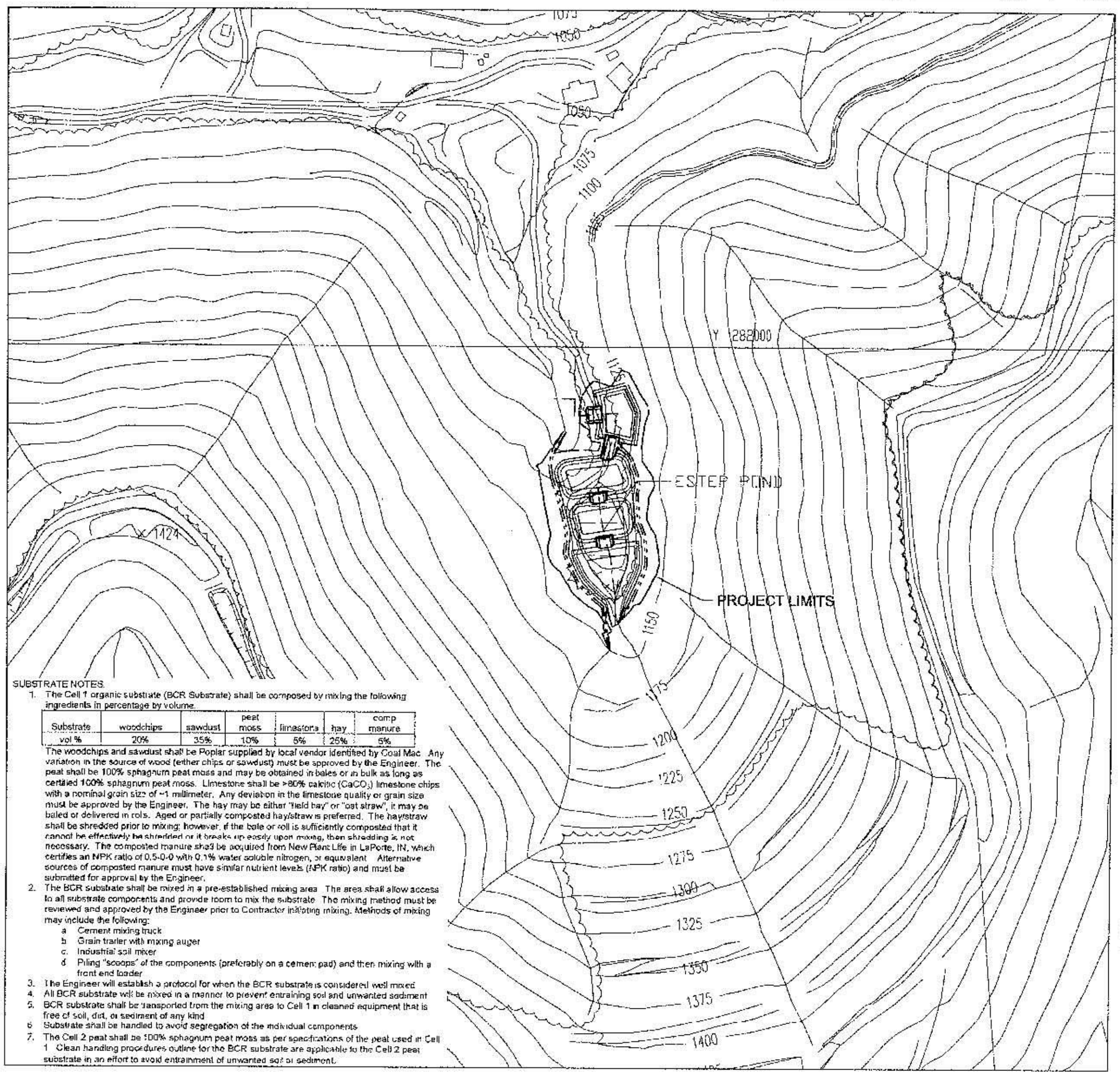
FILENAME: 000-G-0002_408527.dgn PLOT DATE: 10/22/2010 PLOT TIME: 10:37:42 AM



N

0 100 200 300
Scale in Feet

SITE CLEARING NOTES:

1. CLEAR AND GRUB PROJECT AREA AS FOLLOWS, BUT NOT TO EXTEND BEYOND PROJECT LIMITS.
   A. EXCAVATION INCLUDING TRENCHES: 5 FEET BEYOND TOP OF CUT SLOPES.
   B. FILL: 10 FEET BEYOND TOE OF PERMANENT FILL.
2. DO NOT INJURE OR DEFACE VEGETATION THAT IS NOT WITHIN AREA OF IMPROVEMENTS.
3. REMOVE RUBBISH, TRASH, AND JUNK FROM ENTIRE AREA WITHIN PROJECT LIMITS.
4. FELL TREES SO THAT THEY FALL AWAY FROM FACILITIES AND VEGETATION NOT DESIGNATED FOR REMOVAL.
5. SALEABLE LOG TIMBER MAY BE SOLD TO CONTRACTOR'S BENEFIT AT THE APPROVAL OF OWNER. PROMPTLY REMOVE FROM PROJECT SITE.
6. DEBRIS DISPOSAL SHALL BE AS FOLLOWS:
   A. ONSITE BURNING IS PROHIBITED.
   B. STOCKPILED MATERIAL SHALL NOT REMAIN ON SITE IN EXCESS OF 30 DAYS UNLESS APPROVED BY OWNER.
   C. DISPOSE OF DEBRIS OFFSITE.
   D. DEBRIS MAY NOT BE BURIED IN ONSITE DISPOSAL AREAS. IN LIEU OF ONSITE BURIAL, DISPOSE OF DEBRIS OFFSITE.
   E. WOODY DEBRIS MAY BE CHIPPED. CHIPS MAY BE SOLD TO CONTRACTOR'S BENEFIT AT THE APPROVAL OF THE OWNER. DISPOSE OF CHIPS THAT ARE UNSALEABLE WITH UNCHIPPED DEBRIS.
   F. LIMIT OFFSITE DISPOSAL OF CLEARING AND GRUBBING DEBRIS TO LOCATIONS THAT ARE APPROVED BY FEDERAL, STATE, AND LOCAL AUTHORITIES, AND THAT WILL NOT BE VISIBLE FROM PROJECT.

BCR Substrate NOTES.

1. General Notes: The emplacement of BCR organic substrate is a critically important step in the construction of the system.

2. The Media shall be placed in the following sequence following completion of liner/sand installation. The media placement instructions are identical for Cells 1 and 2, except where noted:

a. Substrate shall be installed on top of 12" of sand placed on the liner (see detail 6, C-10, Sheet 13). The top of the 12" sand layer is considered the bottom of the graded cell in the plan drawings.

b. Install piping and infiltrators – refer to diagram

c. Infiltrators shall be the Quick4 Equalizer 24 HD Chambers made by Infiltrator Systems, Inc. Any alternative infiltrator product must be approved by the Engineer prior to installation

d. Install 1"– 2" nominal grain size limestone gravel to a total depth of 14"(6" above the infiltrators, which are 8" in height). Gravel may be installed as a progressive front to allow use of low ground pressure spreading equipment (i.e. "Bobcat"-type front-end loader); however, hand grading and installation may be necessary while filling in around infiltrators. A gravel ramp may be built on the liner to allow access into the lined cell; however, measures must be taken to protect the liner from damage during substrate installation

e. Organic substrates for both Cell 1 and Cell 2 may be installed in a single lift on top of the limestone in a progressive front that allows the contractor to back out of the cell without having to move atop the substrate. The substrate shall not be compacted in any manner. Contractor shall not work on top of the substrate at any time. If the need arises for the contractor to walk atop the substrate, 4-ft by 8-ft sheets of plywood shall be used to create low pressure "walk ways" to minimize compaction, subject to the Engineer's approval.

f. For Cell 1, install 36" of BCR substrate on top of the limestone. This is estimated to be approximately 485 cubic yards of material of final compost mix. Refer to BCR substrate mixing directions below for instructions on mixing and the ratio of individual components.

g. For Cell 2, install 34" of sphagnum peat moss on top of the limestone. This is estimated to be approximately 500 cubic yards of sphagnum peat moss. WARNING, Peat may produce fine particulates during placement. Proper respiratory PPE may be required during installation (e.g., dust mask).

h. For Cell 2, once the peat substrate has been installed, jute mesh should be installed on top of the substrate. If strips of jute meshing are used, the meshing shall be centered at the location of the effluent collector piping (pipes are spaced on 6' centers). If strips of jute meshing are used, they can be no shorter than 3' wide without approval from the engineer.

1. Low pressure mats (i.e., 4-ft by 8-ft plywood sheets) should be laid on top of the peat to allow access onto the peat substrate. DO NOT WALK on substrate without low pressure mats to minimize compaction.

i. After jute meshing is in place, the effluent piping can be laid on top of meshing following the design layout (refer to piping diagram for further details). Piping should be constructed of 4" PVC pipe with two rows of perforations. Perforations should be ¾" holes drilled every 6" on center. The rows should be positioned 180 degrees from one another and at horizontal to the substrate when the pipe is set in place.

j. Following installation of collector piping, seedbank and wetland scrapings from the onsite emergent "borrow" wetland shall be spread on top of the substrate to cover the area between the collector pipes enough to "seed" the area. Installation of the seed material shall be from low pressure mats (i.e., plywood sheets) or from the side bank. DO NOT WALK on the substrate without mats or plywood support sheets as described elsewhere in these specifications. Seed material may be installed simultaneously with the collector piping installation.

3. CONTRACTOR shall install soil erosion protection where needed or indicated around the perimeter of Cells 1 and 2 during installation of the organic media, if necessary. Protection of the organic media from sedimentation is critical to maintain the effectiveness and function of the cells.

4. CONTRACTOR shall ensure the limestone gravel is clean (dry screening acceptable) and free of excessive loose grit, clay, sand, or fine gravel. This is necessary to prevent particulates attached to the gravel from accumulating and clogging soil pore spaces, thereby reducing effectiveness and function of Cells 1 and 2.

5. CONTRACTOR shall seek approval from the Engineer following the installation of each layer in the vertical flow cells (Cells 1 and 2). Each layer of media for each Cell and each collector and distribution pipe installation must receive final approval by the Engineer before the next layer can be installed.

SUBSTRATE NOTES.

1. The Cell 1 organic substrate (BCR Substrate) shall be composed by mixing the following ingredients in percentage by volume.

Substrate	woodchips	sawdust	peat moss	limestone	hay	comp manure
vol %	20%	35%	10%	5%	25%	5%

The woodchips and sawdust shall be Poplar supplied by local vendor identified by Coal Mac. Any variation in the source of wood (either chips or sawdust) must be approved by the Engineer. The peat shall be 100% sphagnum peat moss and may be obtained in bales or in bulk as long as certified 100% sphagnum peat moss. Limestone shall be >80% calcitic ($CaCO_3$) limestone chips with a nominal grain size of ~1 millimeter. Any deviation in the limestone quality or grain size must be approved by the Engineer. The hay may be either "field hay" or "oat straw", it may be baled or delivered in rols. Aged or partially composted hay/straw is preferred. The hay/straw shall be shredded prior to mixing; however, if the bale or roll is sufficiently composted that it cannot be effectively be shredded or it breaks up easily upon mixing, then shredding is not necessary. The composted manure shall be acquired from New Plant Life in LaPorte, IN, which certifies an NPK ratio of 0.5-0-0 with 0.1% water soluble nitrogen, or equivalent. Alternative sources of composted manure must have similar nutrient levels (NPK ratio) and must be submitted for approval by the Engineer.

2. The BCR substrate shall be mixed in a pre-established mixing area. The area shall allow access to all substrate components and provide room to mix the substrate. The mixing method must be reviewed and approved by the Engineer prior to Contractor initiating mixing. Methods of mixing may include the following:
   a. Cement mixing truck
   b. Grain trailer with mixing auger
   c. Industrial soil mixer
   d. Piling "scoops" of the components (preferably on a cement pad) and then mixing with a front end loader
3. The Engineer will establish a protocol for when the BCR substrate is considered well mixed.
4. All BCR substrate will be mixed in a manner to prevent entraining soil and unwanted sediment.
5. BCR substrate shall be transported from the mixing area to Cell 1 in cleaned equipment that is free of soil, dirt, or sediment of any kind.
6. Substrate shall be handled to avoid segregation of the individual components.
7. The Cell 2 peat shall be 100% sphagnum peat moss as per specifications of the peat used in Cell 1. Clean handling procedures outline for the BCR substrate are applicable to the Cell 2 peat substrate in an effort to avoid entrainment of unwanted soil or sediment.

NO.	DATE	DESCRIPTION	APVR	N
NO.	DATE	REVISION	BY	APVD

DSGN / DR / CHK / APVD

OUTLET 002
SELENIUM PASSIVE TREATMENT SYSTEM
COAL - MAC, INC.

OVERALL SITE PLAN / SITE ACCESS
CIVIL

CH2MHILL

1" = 100'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	OCTOBER 2010
PROJ	408527
DWG	G-03
SHEET	3

PRELIMINARY

FILENAME: 000-G-0004_408527.dgn PLOT DATE: 10/27/2010 PLOT TIME: 10:44:27 AM

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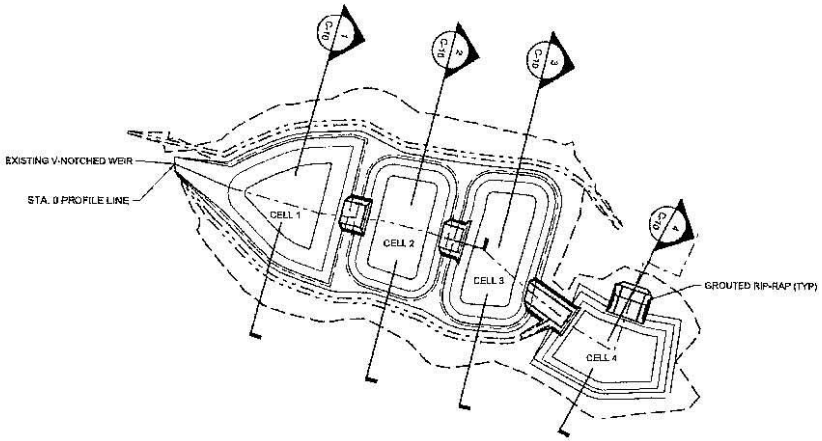
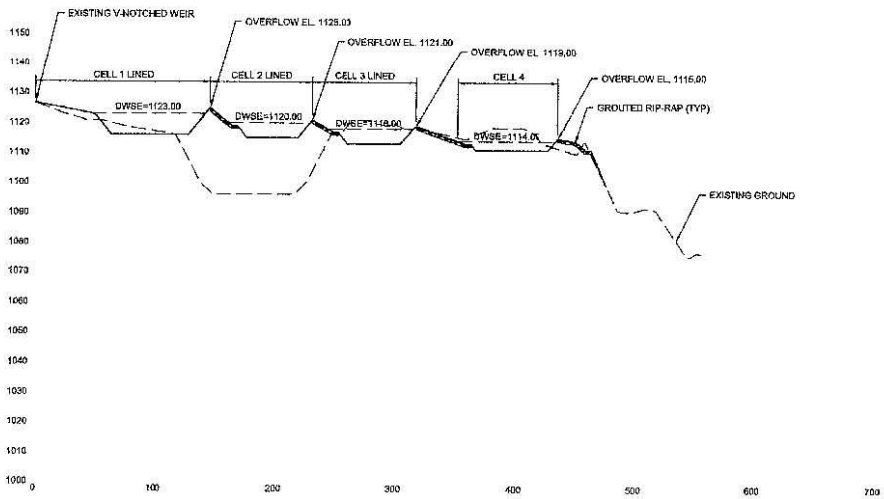
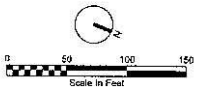




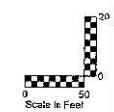


Cell 1 Vertical Downflow (Lined)			
	Elevation	Depth	Area (sf)
Bottom El	1116.00		3,971.35
		1.16	
Top of Rock layer	1117.16		3,542.47
		3.00	
Top of Substrate	1120.16		6,139.69
		2.84	
DWSE	1123.00		7,311.61
		2.00	
Overflow	1125.00		9,147.40
		2.00	
Top of Berm	1127.00		9,217.05

Cell 2 Vertical Upflow (lined)			
	Elevation	Depth	Area (sf)
Bottom El	1115.00		3,394.17
		1.16	
Top of Rock	1116.16		3,903.72
		2.84	
Top of substrate	1119.00		6,426.91
		1.00	
DSWE	1120.00		6,265.92
		1.00	
Overflow	1121.00		7,834.51
		2.00	
Top of Berm	1123.00		8,383.67

Cell 3 Vertical Downflow (Lined)			
	Elevation	Depth	Area (sf)
Bottom El	1113.00		3,821.69
		4.00	
Top of Gravel	1117.00		6,349.66
		1.00	
DWSE	1118.00		7,026.58
		1.00	
Overflow	1119.00		8,458.28
		2.00	
Top of Berm	1121.00		9,213.14

Cell 4 Surface Flow (Unlined)			
	Elevation	Depth	Area (sf)
Bottom El	1111.00		3,415.13
		1.00	
Top of soil	1112.00		3,964.96
		2.00	
DSWE	1114.00		4,879.02
		1.00	
Overflow	1115.00		5,564.52
		2.00	
Top of Berm	1117.00		6,476.22



Case 2:11-cv-00133 Document 24 Filed 03/01/11 Page 5 of 7 PageID #: 164

NO.	DATE	DESCRIPTION	APVR	N
NO.	DATE	REVISION	BY	APVD

CH2MHILL

CIVIL

SITE LAYOUT TREATMENT CELLS
PLAN AND PROFILE

OUTLET 002
SELENIUM PASSIVE TREATMENT SYSTEM
COAL - MAC, INC.

1" = 50'
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	OCTOBER 2010
PROJ	408527
DWG	C-01
SHEET	4

PRELIMINARY

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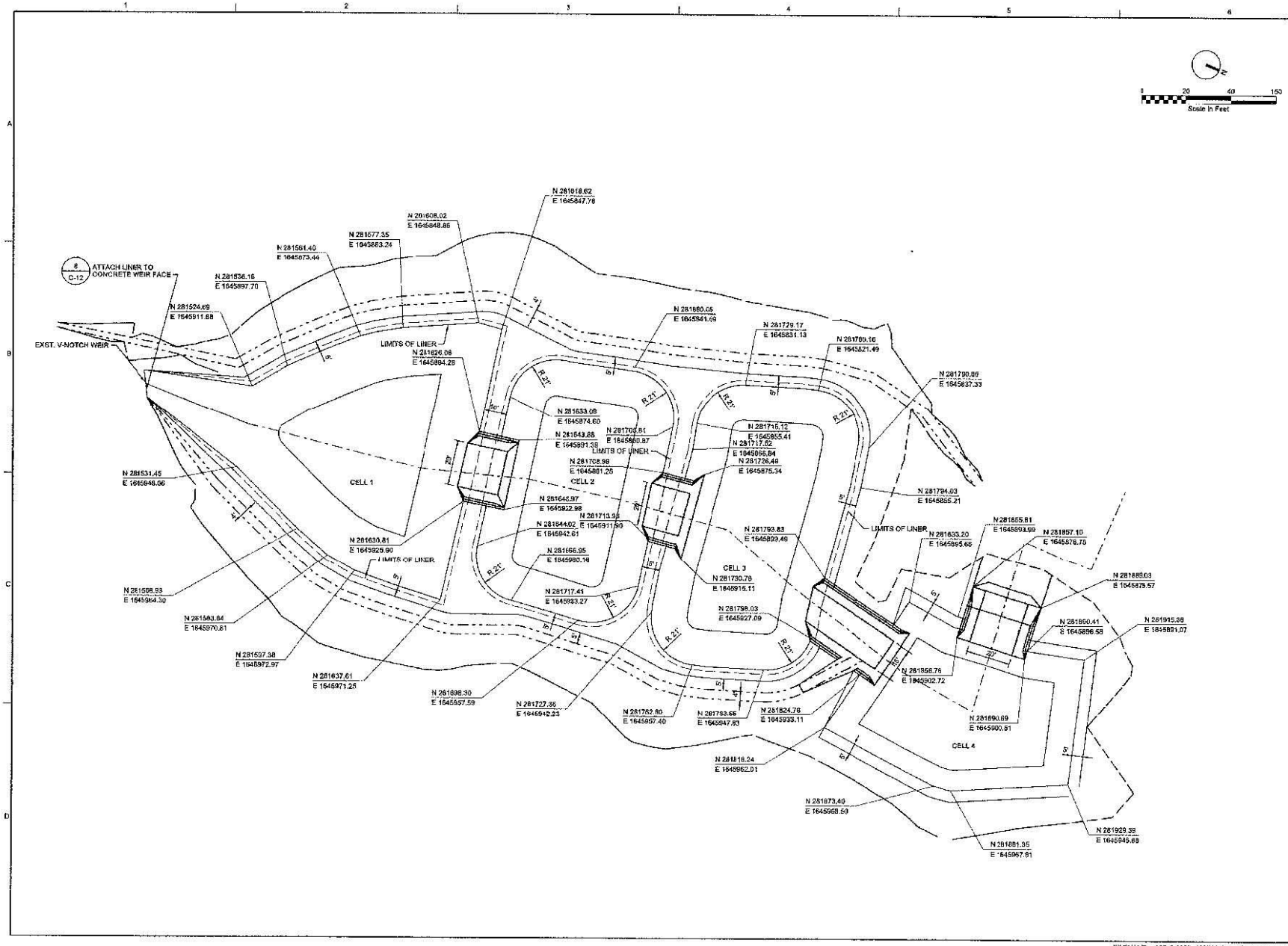

CH2MHILL

CIVIL

CELL LAYOUT PLAN

OUTLET 002

SELENIUM PASSIVE TREATMENT SYSTEM

COAL - MAC, INC.

NO.	DATE	DESCRIPTION	APVR	BY	APVD

REVISION

CHECKED BY

FRANK

BOWLES

APPROVED BY

1" = 20'

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.

DATE	OCTOBER 2010
PROJ	408527
DWG	C-02
SHEET	5

PRELIMINARY

FILENAME: 005-C-2002_408527.dgn PLOT DATE: 10/22/2010 PLOT TIME: 12:27:59 PM

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