Comanche Station
Groundwater Sampling and
Bottom Ash Treatment System Updates
March 4, 2021

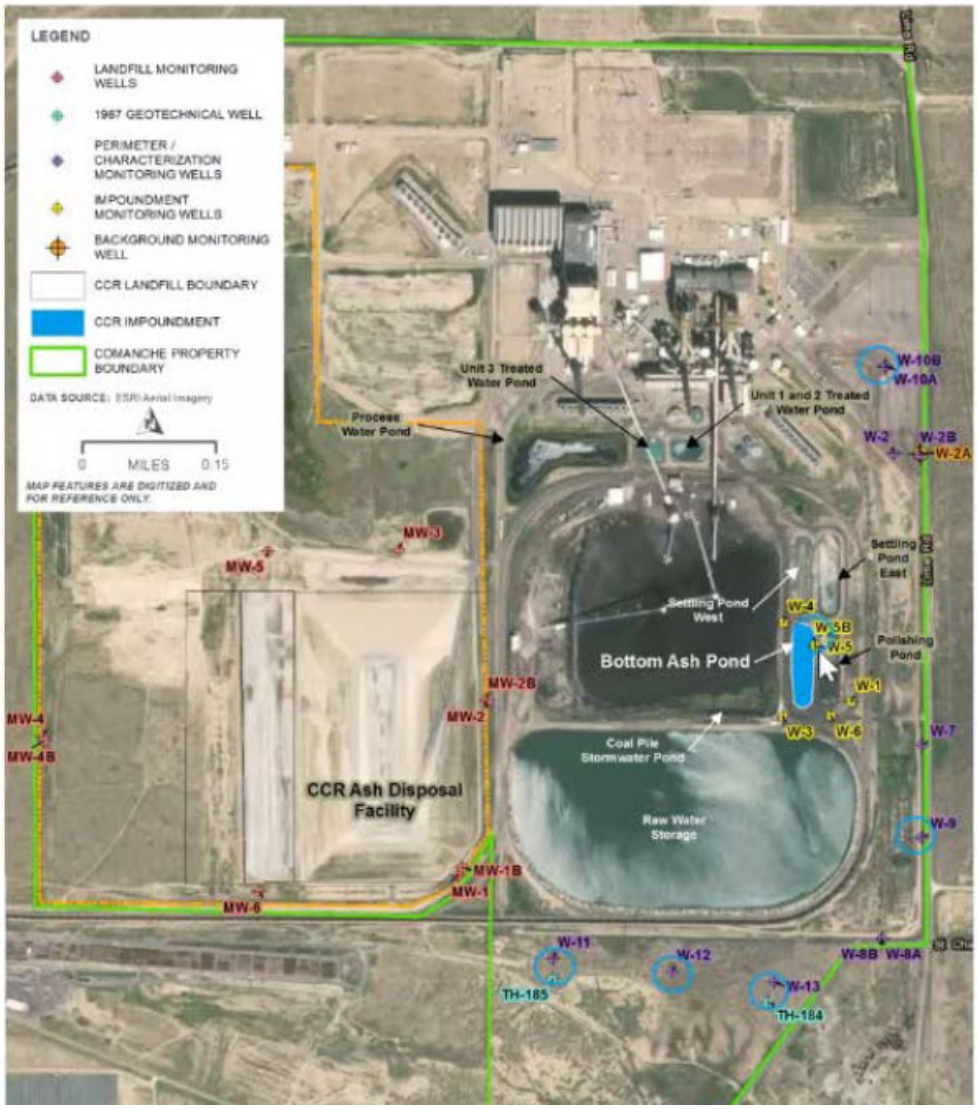
Introductions

Comanche BAP and Site Investigations

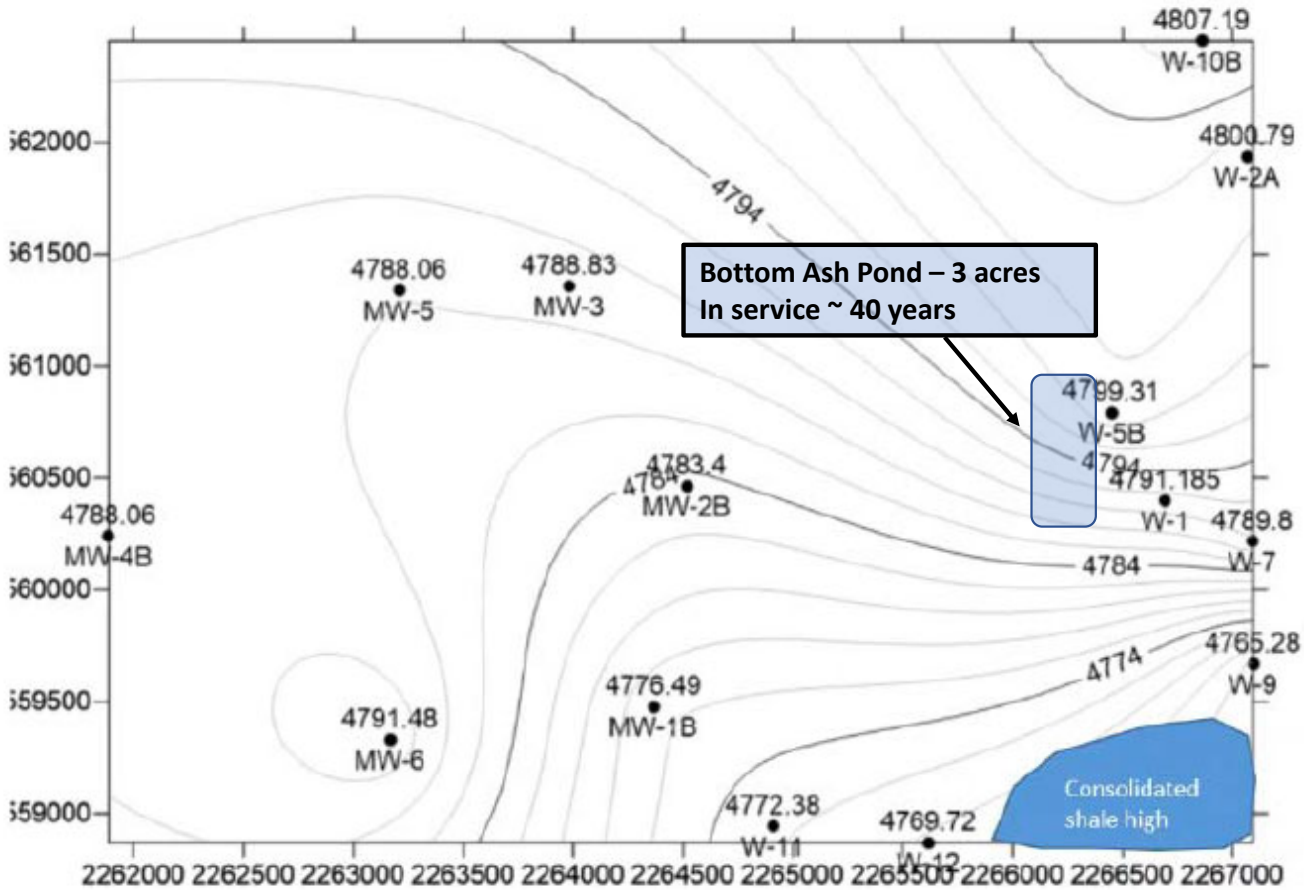
- Multiple historic investigations – shallow perched water in colluvium
- Anticipated Part B liner equivalency demonstration
- Part A extension request – opted not to pursue, believed could meet April

- August 2020 – Phase 1
  - Anticipate confirmation of site conceptual model
  - 8 wells into weathered bedrock
  - 6 wells have water for sampling
  - First indication of continuous water at site
  - Part B demonstration no longer option

- December – Phase 2
  - 2 wells eastern property line
  - 3 wells south of pond area


LEGEND
LANDFILL MONITORING WELLS
1987 GEOTECHNICAL WELL
PERIMETER / CHARACTERIZATION MONITORING WELLS
IMPOUNDMENT MONITORING WELLS
BACKGROUND MONITORING WELL
CCR LANDFILL BOUNDARY
CCR IMPOUNDMENT
COMANCHE PROPERTY BOUNDARY
DATA SOURCE: ESRI Aerial Imagery
0 MILES 0.15
MAP FEATURES ARE DIGITIZED AND FOR REFERENCE ONLY.
Unit 3 Treated Water Pond
Process Water Pond
Unit 1 and 2 Treated Water Pond
W-10B
W-10A
W-2
W-2B
W-2A
MW-3
MW-5
Settling Pond East
Settling Pond West
W-4
W-5B
W-5
Polishing Pond
Bottom Ash Pond
W-1
MW-2B
MW-2
MW-4
MW-4B
W-3
W-6
W-7
Coal Pile Stormwater Pond
CCR Ash Disposal Facility
Raw Water Storage
W-9
MW-1B
MW-1
MW-6
W-11
W-12
W-8B
W-8A
TH-185
W-13
TH-184

January 2021 GW contours, weathered bedrock wells only



HDR, Inc.
8701 S Meridian Blvd, Suite 400
Englewood, CO 80112

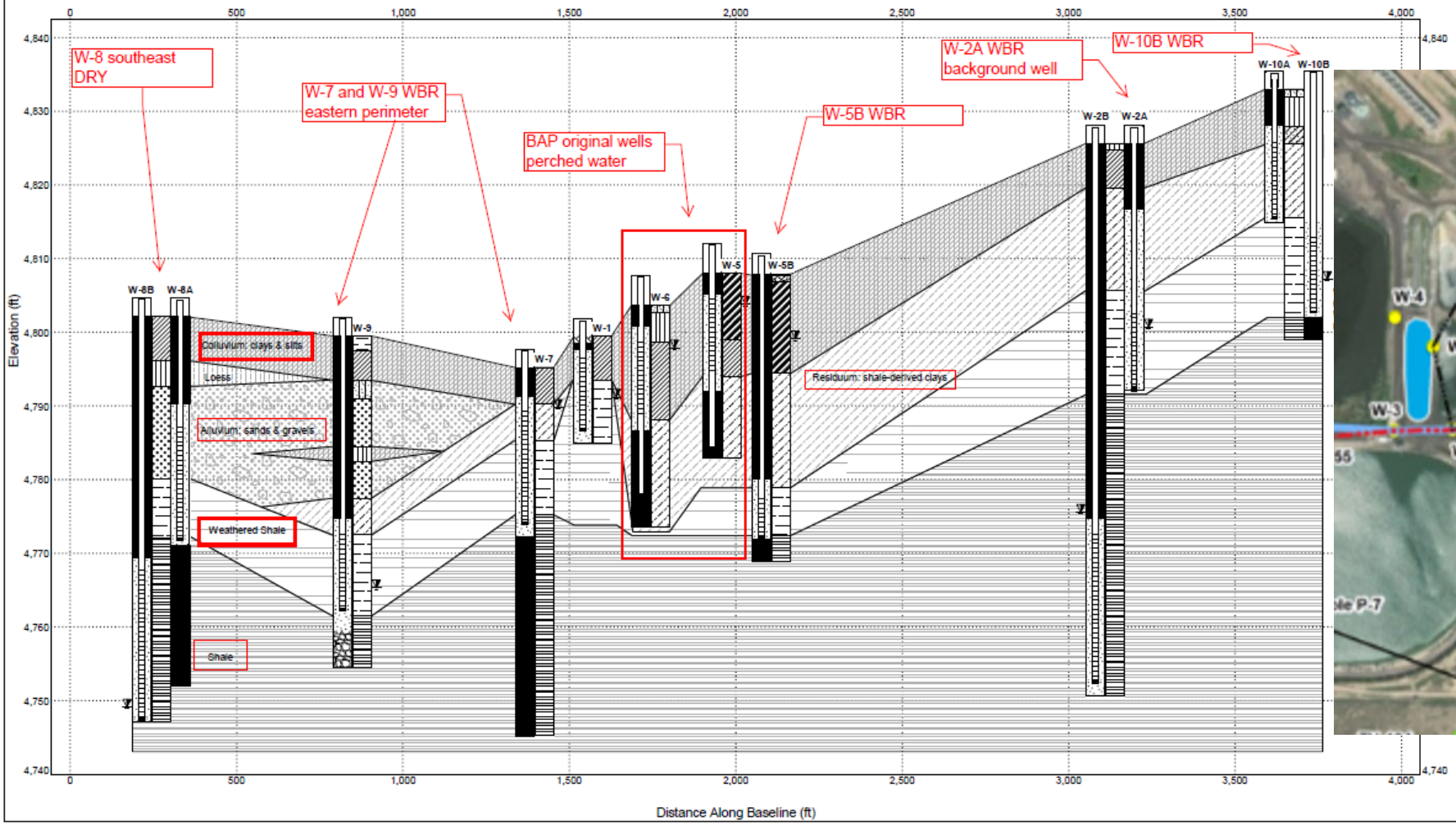
Preliminary

D --- D'
South - North

SUBSURFACE DIAGRAM

CLIENT Xcel Energy
PROJECT NUMBER 10217175
PROJECT NAME Comanche Station
PROJECT LOCATION Pueblo, CO

USCS Low Plasticity Clay
Residuum: shale-derived clays
Asphalt
USCS Well-graded Sand
Weathered Shale
Shale
USCS Clayey Gravel
USCS Low Plasticity Organic silt or clay
USCS Silt
USCS High Plasticity Clay
USCS Silty Sand
USCS Clayey Sand



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Preliminary

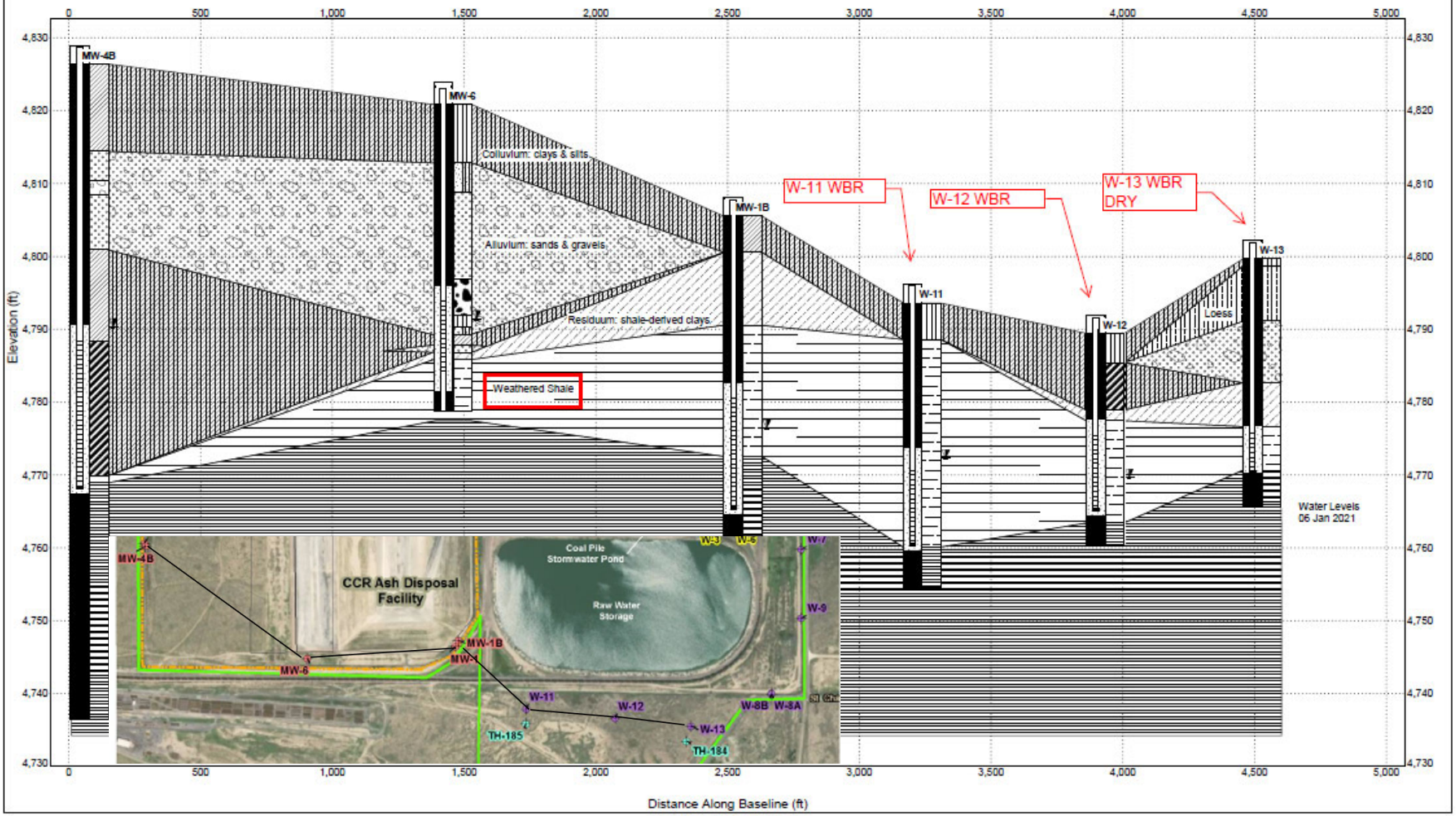
C --- C'
West - East

SUBSURFACE DIAGRAM

CLIENT Xcel Energy
PROJECT NUMBER 10217175

PROJECT NAME Comanche Station
PROJECT LOCATION Pueblo, CO

USCS Low Plasticity Clay
Shale
USCS High Plasticity Clay
USCS Well-graded Gravel
Residuum: shale-derived clays
USCS Well-graded Sand
USCS Silt
USCS Well-graded Sand with Silt
Weathered Shale
USCS Poorly-graded Gravel
USCS Poorly-graded Sand with Silt
Aeolian silt



Sampling Update

- W-2A = background well (8 samples, BTV's)
- Additional wells installed Dec. 2020
- First detection monitoring sample Jan. 2021
- Detection monitoring results
  - W-2A shale poor quality – chloride, sulfate, TDS, boron (BTV 4 mg/l)
  - SSI for boron in W-1 and W-6
  - All other wells boron < up-gradient concentrations
  - No apparent migration vertically or laterally
  - pH – 'SSI's' = field values, not unique to BAP
    - Process water ponds
    - discharge permit pH limit 6.5 – 9 SU
  - Assessment monitoring to begin ~ next month

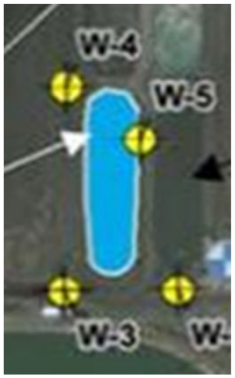
Upper Prediction Limits for Detection Monitoring for each Appendix III Constituent in Comanche Pond W-2A as background Well

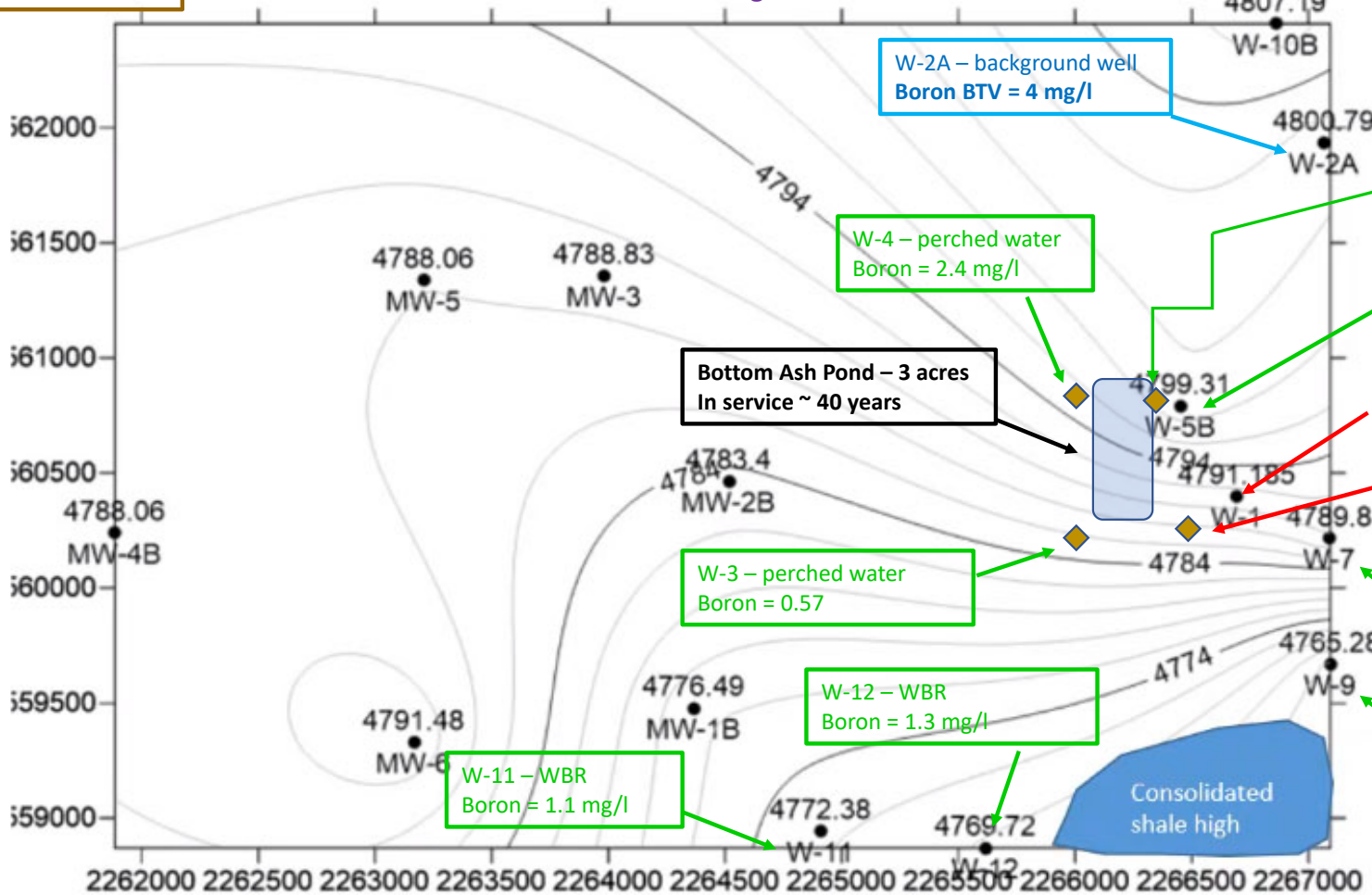
Type	Constituent	Unit	n	BTV[A]	January 12-14, 2021 DM Sample Event									
					W-3	W-5	W-5B	W-6	W-4	W-1	W-7	W-9	W-11	W-12
Appendix II	Boron	mg/l	8	4.00	0.57	3.8	1	7.5	2.4	4.1	2.2	1.9	1.1	1.3
Appendix II	Calcium	mg/l	8	657	300	200	480	210	420	420	440	380	370	160
Appendix II	Chloride (a	mg/l	8	897	23	560	110	180	480	760	770	360	350	870
Appendix II	Fluoride	mg/l	8	578	0.68	<0.5	<0.5	1.7	4.4	3.1	<0.5	<0.5	2.7	<0.5
Appendix II	pH (field) (l	su	8	6.22	7.74	7.26	7.07	7.36	7.68	7.37	6.61	6.87	6.89	6.83
Appendix II	pH (field) (l	su	8	6.73	7.74	7.26	7.07	7.36	7.68	7.37	6.61	6.87	6.89	6.83
Appendix II	Sulfate (as	mg/l	8	86,791	1300	13000	3600	4800	29000	29000	48000	11000	14000	16000
Appendix II	Total Disso	mg/l	8	202,620	2000	16000	5300	6200	NA	42000	69000	16000	20000	23000

Perched water wells

January 2021 GW contours, weathered bedrock wells only

First Detection Monitoring Results





Bottom Ash Treatment System Update

Bottom Ash Treatment Planned Approach

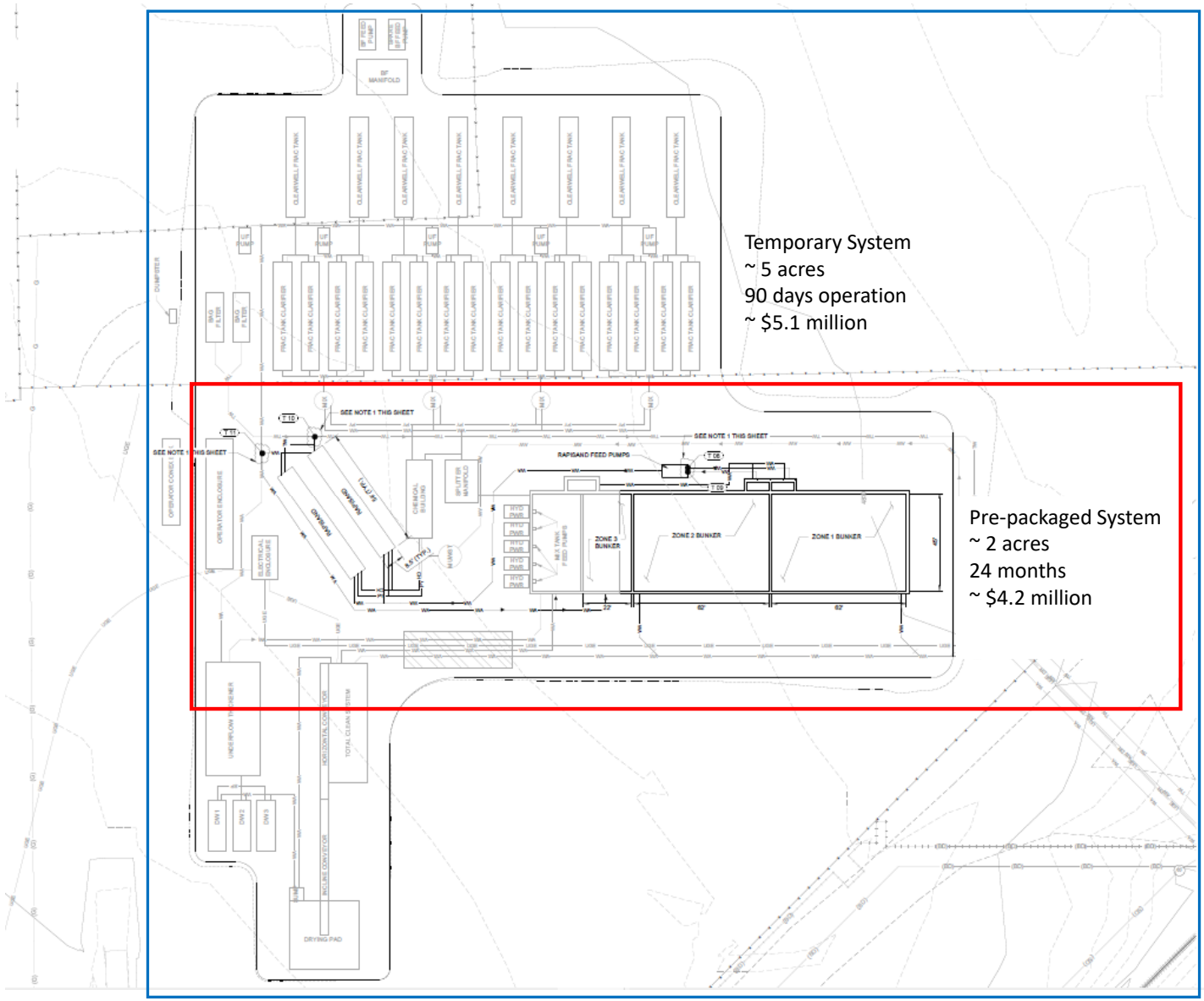
- "Pre-Packaged"
  - Bunkers (4), two Flocculating Clarifiers 3,000 gpm peak flow, chemical feed system, PLC
  - June 2021, if site prep complete (could be as late as August)
  - 24-month operation (~ $4.2M)
  - System operation or new CCR pond through 2025

- Temp System – necessary to meet April 11th
  - Currently unlikely to meet this date, complexity of system tie-in
  - "Total Clean" system – hydro-cyclone shakers, tilted plate baffles, dry cake
  - Chemical feed, 16 clarifiers, 8 clear wells, 2 bag filter trailers, thickeners, bunker zone 4
  - No PLC, labor intensive, manual system balancing
  - 90 days minimum temporary operation (~ $5.1M)

Bottom Ash Treatment Planned Approach

- Site prep/other
  - Ceased non-CCR flows to pond as of January 31st
  - Discharge permit issued March 1st, April 1st effective date
  - Rail crossing trenchless borings complete, grading and other site prep in progress
  - U1 & U2 overlapping outage for system tie-in
  - *Complex system interconnections and plant tie-in**

* Critical path to meet April 11th



LEGEND:

- EXISTING MAJOR CONTOURS (5')
- EXISTING MINOR CONTOURS (1')
- LIMITS OF DISTURBANCE
- ACCESS ROAD
- EXISTING FENCE
- (AW) EXISTING ASH WATER LINE
- (DR) EXISTING DRAIN LINE
- (SC) EXISTING STORMWATER CULVERT
- (FP) EXISTING FIRE PROTECTION LINE
- (BD) EXISTING BLOW DOWN DRAIN
- (WA) EXISTING WATER ASH LINE
- UGE PROPOSED ELECTRICAL DUCT BANK
- WA PROPOSED WATER ASH LINE
- TW PROPOSED TREATED WATER LINE
- DR PROPOSED DRAIN LINE
- AW PROPOSED ASH WATER LINE
- SP PROPOSED SPECIAL LINE
- CH PROPOSED COAGULENT LINE
- PY PROPOSED POLYMER LINE

NOTES:

1. THE BUBBLED PORTIONS OF THE SITE PLAN DEPICT WORK RELATED TO TIE-IN FROM EQUIPMENT VENDOR PIPING AND CONTRACTOR PIPING. ADDITIONAL INFORMATION ON TIE IN REQUIREMENTS AND LOCATION TO BE COMPLETED AND RELEASED AT A LATER DATE.
2. EQUIPMENT LOCATIONS ARE SUBJECT TO CHANGE, IF RELOCATION OF PROPOSED EQUIPMENT IS REQUIRED, ENGINEER TO COORDINATE RELOCATION WITH CONTRACTOR.
3. CONTRACTOR TO COORDINATE WITH COMPANY ON REMOVAL PHASING OF EXISTING EQUIPMENT AND TEMPORARY PIPING. REMOVAL OF TEMPORARY EQUIPMENT AND TEMPORARY PIPING IS THE RESPONSIBILITY OF THE EQUIPMENT VENDOR.

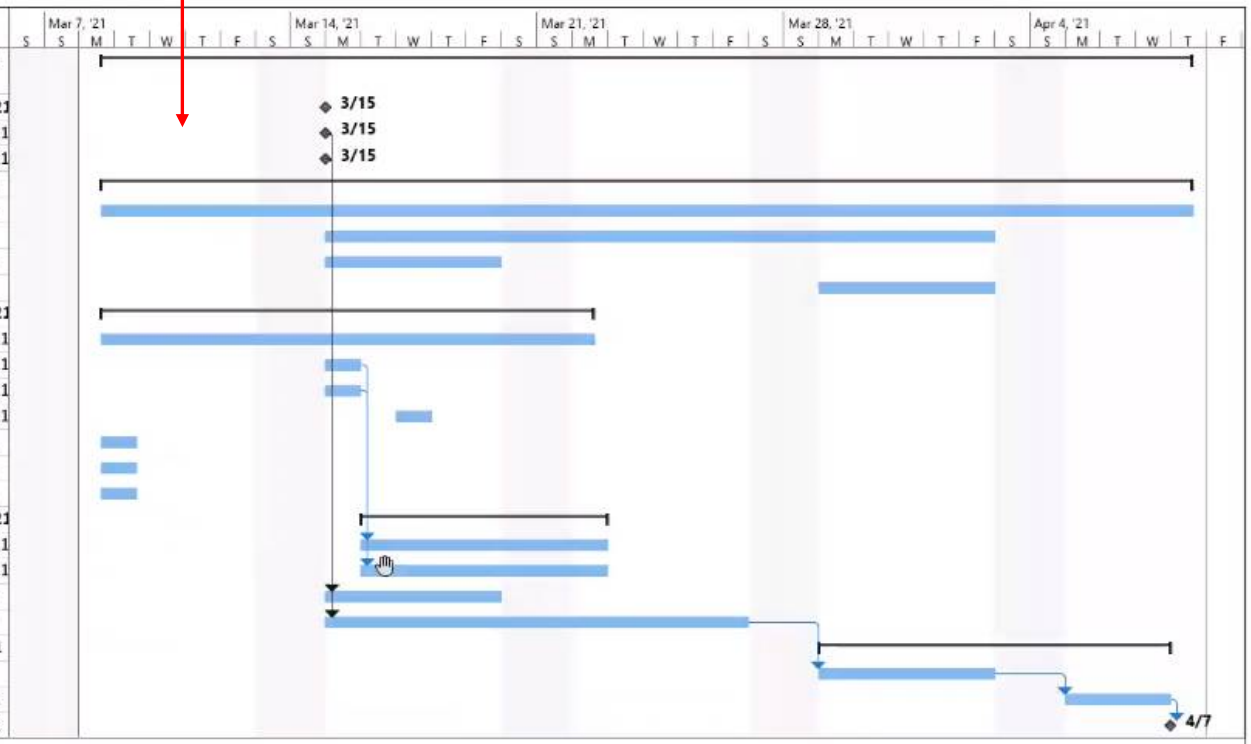
PIPING TIE-IN POINT TABLE

POINT NO.	NORTHING	EASTING	DESCRIPTION
T 06	582,223.74	2,266,837.56	OUTLET BOX 1 TIE-IN
T 09	582,223.74	2,266,835.74	OUTLET BOX 2 TIE-IN
T 10	582,395.36	2,266,851.57	TREATED WATER TIE-IN
T 11	582,419.57	2,266,844.25	RAPIDAND TIE-IN

Temporary System Installation Schedule

Site prep critical path

ID	Task Name	Duration	Start	Finish
1	**24383 - 2010552 - Xcel Comanche Project Temporary System Tasks**	**23 days**	**Mon 3/8/21**	**Thu 4/8/21**
2	**Site Preparation Completion**	**0 days**	**Mon 3/15/21**	**Mon 3/15/21**
3	Site leveling	0 days	Mon 3/15/21	Mon 3/15/21
4	Bunker Zone 4 Alternative	0 days	Mon 3/15/21	Mon 3/15/21
5	**Representatives Arriving on Site**	**23 days**	**Mon 3/8/21**	**Thu 4/8/21**
6	WesTech Representative	23 days	Mon 3/8/21	Thu 4/8/21
7	United Rental Representative	15 days	Mon 3/15/21	Fri 4/2/21
8	Del Tank Representative	5 days	Mon 3/15/21	Fri 3/19/21
9	Clearwater Industries Representativ	5 days	Mon 3/29/21	Fri 4/2/21
10	**Equipment Arrival**	**10 days**	**Mon 3/8/21**	**Mon 3/22/21**
11	United Rental Equipment	10 days	Mon 3/8/21	Mon 3/22/21
12	Del Tank Equipment	1 day	Mon 3/15/21	Mon 3/15/21
13	Polymer Makedown System	1 day	Mon 3/15/21	Mon 3/15/21
14	Coagulant Feed Skids	1 day	Wed 3/17/21	Wed 3/17/21
15	Mix Tanks	1 day	Mon 3/8/21	Tue 3/9/21
16	Job Trailer	1 day	Mon 3/8/21	Tue 3/9/21
17	Container Connex	1 day	Mon 3/8/21	Tue 3/9/21
18	**Assembly of Equipment**	**5 days**	**Tue 3/16/21**	**Mon 3/22/21**
19	Del Tank Equipment	5 days	Tue 3/16/21	Mon 3/22/21
20	Polymer Makedown System	5 days	Tue 3/16/21	Mon 3/22/21
21	Equipment Placements	5 days	Mon 3/15/21	Fri 3/19/21
22	Equipment Installation	10 days	Mon 3/15/21	Fri 3/26/21
23	**Commissioning & Startup**	**8 days**	**Mon 3/29/21**	**Wed 4/7/21**
24	Commissioning	5 days	Mon 3/29/21	Fri 4/2/21
25	Startup	3 days	Mon 4/5/21	Wed 4/7/21
26	Processing Water	0 days	Wed 4/7/21	Wed 4/7/21



Summary

- Detection Monitoring results, no apparent migration, bounded
- Ceased non-CCR flows January 31st
- Discharge permit issued March 1st, April 1st effective date
- Pre-packaged system – on-line date ~ August +
- Temp system – unlikely to meet April 11th
  - Site prep and complex tie-ins
  - Operate until pre-packaged system on-line
- U1 & U2 overlapping outage for tie-in

Discussion

- Path forward
  - Framework/process to establish extended cease receipt date
  - Treatment of unsuccessful Part A applications?
  - If extension approved for Comanche, is temporary system necessary?