SUNNYSIDE R&S ACT/007/035-95C
95C

REFUSE PILE/WEST SLURRY CELL

Form DOGM - E (Last Revised 6/93)

File Folder # 3

PERMIT CHANGE TRACKING FORM

DATE RECEIVED	3/8/95	PERMIT NUMBER	ACT/007/035
Title of Proposal:	Refuse Pile Area	PERMIT CHANGE #	95C
Description:	Slurry Cell Characterization	PERMITTEE	SCA
		MINE NAME	Sunnyside Refuse Slurry

Meeting on 3/8 - Rec'd 3/9/95

	DATE DUE	DATE DONE	RESULT
☐ 15 DAY INITIAL RESPONSE TO PERMIT CHANGE APPLICATION			☐ ACCEPTED ☐ REJECTED
☐ Notice of Review Status of proposed permit change sent to the Permittee.			
☐ Request additional review copies prior to Division/Other Agency review.			
☐ Notice of Approval of Publication. (If change is a Significant Revision.)			
☐ Notice of request to modify proposed permit change prior to approval.			

Permit Change Classification

- ☐ Significant Permit Revision
- ☐ Permit Amendment
- ☐ Incidental Boundary Change

REVIEW TRACKING	INITIAL REVIEW		MODIFIED REVIEW		FINAL REVIEW AND FINDINGS	
DOGM REVIEWER	DUE	DONE	DUE	DONE	DUE	DONE
☐ Administrative ____						
☐ Biology ____						
☐ Engineering ____						
☐ Geology ____						
☐ Soils HS	5/12					
☐ Hydrology ____						
☐ Bonding ____						
☐ AVS Check ____						

COORDINATED REVIEWS	DUE	DONE	DUE	DONE	DUE	DONE
☐ OSMRE						
☐ US Forest Service						
☐ Bureau of Land Management						
☐ US Fish and Wildlife Service						
☐ US National Parks Service						
☐ UT Environmental Quality						
☐ UT Water Resources						
☐ UT Water Rights						
☐ UT Wildlife Resources						
☐ UT State History						
☐ Other						

☐ Public Notice/Comment/Hearing Complete (If the permit change is a Significant Revision)		☐ Permit Change Approval Form signed and approved effective as of this date. ☐ Permit Change Denied.	
☐ Copies of permit change marked and ready for MRP.		☐ Notice of ☐ Approval ☐ Denial to Permittee.	
☐ Special Conditions/Stipulations written for approval.		☐ Copy of Approved Permit Change to File.	
☐ TA and CHIA modified as required.		☐ Copy of Approved Permit Change to Permittee.	
☐ Permit Change Approval Form ready for approval.		☐ Copies to Other Agencies and Price Field Office.	

State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
Governor
Ted Stewart
Executive Director
James W. Carter
Division Director

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340
801-359-3940 (Fax)
801-538-5319 (TDD)

April 26, 1995

TO: Daron Haddock, Permit Supervisor

TO: J.Randell Harden, Senior Reclamation Engineer

FROM: Henry Sauer, Senior Reclamation Soils Specialist

RE: Amendment 95C: Refuse Pile Drilling and Characterization of the Acid- and Toxic- Forming and Alkalinity Producing Potential of the Refuse Pile and Slurry Ponds, Sunnyside Refuse and Slurry, Sunnyside Cogeneration Associates, ACT/007/035, Carbon County, Utah

SYNOPSIS

The permittee has submitted (received April 12, 1995) a revised drilling program for the characterization of the acid- and toxic- forming and alkalinity producing potential of the Sunnyside Coarse Refuse Pile and Slurry Ponds. The characterization of the acid- and toxic- forming and alkalinity producing potential of the Sunnyside Coarse Refuse Pile and Slurry Ponds is a requirement of Permit Findings Document dated February 4, 1993, Condition #18 **R645-301-731-300 (HS)** and Notice of Violation N94-13-2-1.

The permittee proposed (March 1, 1994) a refuse drilling program to determine the acid-and/or toxic-forming potential of the refuse material (Appendix 6-5). Except for some minor changes this proposal was technically adequate (See technical memo dated March 7, 1994). The drilling program proposed eleven drill holes. Samples were to be collected and analyzed through the full length of the drill holes. This plan was a synthesis of the Division's proposal (see memo to file dated February 2, 1994), Eckoff, Watson and Preator Engineer's original proposal (dated September 15, 1993) and discussions held between these entities on February 2, 1994.

The Division then received a letter (hand delivered on August 26, 1994) from the law firm of Callister Nebeker & McCullough (CN&M), representing Sunnyside Cogeneration Associates (SCA). The letter requested an exemption from the requirement to characterize the acid- and toxic- forming and alkalinity producing potential of the coarse refuse pile and slurry ponds.

Upon receipt of the aforementioned request this writer sent a technical memo (dated September 6, 1994) to Division Director Jim Carter. Relevant regulatory requirements and technical issues were thoroughly reviewed by this writer and a request for an immediate negative response to the permittee's waiver proposal was recommended.

In a letter addressed to Mr. David R. Pearce, representing Sunnyside Cogeneration Associate (dated November 16, 1994) the Division Director recommended that Division Staff and representatives of SCA meet to discuss the drilling and characterization program. The Division was later informed (See letter from Alane E. Boyd {Eckoff Watson & Preator [EW&P]} to James W. Carter dated January 30, 1995) that NRG Energy Inc. and Bobcock & Wilcox were the new owners and operators of the Sunnyside refuse and slurry facility.

On February 21, 1995 representatives of the Division (i.e. Lowell Braxton, J.Randell Harden, Joe Helfrich and Henry Sauer) staff met with representative of NRG Energy Inc. and Bobcock & Wilcox and EW&P. In this meeting the Division allowed the permittee to propose an alternative (March 8, 1995) to the previously approved drilling and characterization plan.

In a meeting held on March 22, 1995 the permittee, EW&P and myself discussed and revised the March 8, 1995 proposal. Subsequent to this meeting the permittee submitted a new proposal on April 12, 1995.

In the interest of addressing the protracted permit issues it is imperative that the refuse drilling and characterization program be implemented as soon as possible. Therefore, the April 12, 1995 drilling program proposal is an acceptable alternative to the previously approved drilling program. However, addition analyses and investigations may be subsequently required to fulfill the requirements of the R645-301 and R645-302 Coal Mining Rules.

RECOMMENDATION

Approve amendment ACT/007/035-95C.

CC: Ken Wyatt
Susan White

SUNNYSIDE COGENERATION FACILITY
Sunnyside Operations Associates, L.P.
Post Office Box 10
East Carbon, Utah 84520
(801) 888-4476
(801) 888-2538 fax

April 10, 1995

Ms. Pamela Grubaugh-Littig
Division of Oil, Gas and Mining
3 Triad Center - Suite 350
Salt Lake City, Utah 84180-1203

RE: Permit No. ACT/007/035: Sunnyside Cogeneration Associates
Permit Submittal: NOV N93-13-2-1, Permit Condition #18
Engineer's Project No. EC450593

Dear Pam,

This submittal includes a revision to PAP Appendix 6-5 which details the plan for characterization of the Refuse Pile/West Slurry Cell to meet requirements of NOV N93-13-2-1, and Permit Condition #18. The revisions reflect the concepts as discussed and agreed in a meeting with Henry Sauer at DOGM on March 28, 1995. Please review these revisions as quickly as possible so that SCA can proceed with the work planned.

If you have any questions concerning this submittal, please feel free to call the SCA Plant Manager, at (801) 888-4476.

Sincerely,

Thomas G. Eckstein
Acting Plant Manager

TGE/lls

Attachments

c.c. Bob Evans, NRG
Jim O'Donnell, NRG
Doug Burnham, B&W
Alane E. Boyd, EWP
Brian Burnett, CNM
Bill Malencik, DOGM
Henry Sauer, DOGM
Joe Helfrich, DOGM (letter)

APPLICATION FOR PERMIT CHANGE

Title of Change: SUNNYSIDE COGENERATION ASSOCIATES
Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18
Plan for Characterization of the Refuse Pile/West Slurry Cell

Permit Number: ACT/007/035

Mine: Sunnyside Cogen. Assoc.

Permittee: Sunnyside Cogen. Assoc.

Description - include reason for change and timing required to implement: Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18; Plan for Characterization of the Refuse Pile/West Slurry Cell

☐ Yes	☒ No	1. Change in the size of the Permit Area? _____ acres ☐ increase ☐ decrease.
☐ Yes	☒ No	2. Change in the size of the Disturbed Area? _____ acres ☐ increase ☐ decrease.
☐ Yes	☒ No	3. Will permit change include operations outside the Cumulative Hydrologic Impact Area?
☐ Yes	☒ No	4. Will permit change include operations in hydrologic basins other than currently approved?
☐ Yes	☒ No	5. Does permit change result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes	☒ No	6. Does permit change require or include public notice publication?
☒ Yes	☐ No	7. Permit change as a result of a Violation? Violation # N93-13-2-1 , PERMIT CONDITION 18
☐ Yes	☒ No	8. Permit change as a result of a Division Order? D.O. #
☐ Yes	☒ No	9. Permit change as a result of other laws or regulations? Explain:
☐ Yes	☒ No	10. Does permit change require or include ownership, control, right-of-entry, or compliance information?
☐ Yes	☒ No	11. Does the permit change affect the surface landowner or change the post mining land use?
☒ Yes	☐ No	12. Does permit change require or include collection and reporting of any baseline information?
☐ Yes	☒ No	13. Could the permit change have any effect on wildlife or vegetation outside the current disturbed area?
☐ Yes	☒ No	14. Does permit change require or include soil removal, storage or placement?
☐ Yes	☒ No	15. Does permit change require or include vegetation monitoring, removal or revegetation activities?
☐ Yes	☒ No	16. Does permit change require or include construction, modification, or removal of surface facilities?
☐ Yes	☒ No	17. Does permit change require or include water monitoring, sediment or drainage control measures?
☐ Yes	☒ No	18. Does permit change require or include certified designs, maps, or calculations?
☐ Yes	☒ No	19. Does permit change require or include underground design or mine sequence and timing?
☐ Yes	☒ No	20. Does permit change require or include subsidence control or monitoring?
☐ Yes	☒ No	21. Have reclamation costs for bonding been provided or revised for any change in the reclamation plan?
☐ Yes	☒ No	22. Is permit change within 100 feet of a public road or perennial stream or 500 feet of an occupied dwelling?
☐ Yes	☒ No	23. Is this permit change coal exploration activity ☐ inside ☐ outside of the permit area? N/A

☒ **Attached 3 complete copies of proposed permit change as it would be incorporated into the Mining and Reclamation Plan.**

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all aspects with the laws of Utah in reference to commitments, undertakings, and obligations herein.

E. Boyd, P.E. 4/10/95
Signed - Name - Position - Date

Subscribed and sworn to before me this 10th day of April, 19 95

Notary Public

My Commission Expires: 3/8/97, 19____

Attest: STATE OF Utah)
COUNTY OF Salt Lake) ss:

NOTARY PUBLIC
MARILYN YOUNG
1121 E. 6960 S. #160
Salt Lake City, Utah
My Commission Expires
3-8-97
STATE OF UTAH

RECEIVED
APR 12 1995
DIV OF OIL, GAS & MINING

Received by Oil, Gas & Mining

ASSIGNED PERMIT CHANGE NUMBER

Application for Permit Change
Detailed Schedule of Changes to the Permit

Title of Change: SUNNYSIDE COGENERATION ASSOCIATES
Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18
Plan for Characterization of the Refuse Pile/West Slurry Cell

Permit Number: ACT/007/035

Mine: Sunnyside Cogen. Assoc.

Permittee: Sunnyside Cogen. Assoc.

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit change. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages or other information as needed to specifically locate, identify and revise the exiting mining and reclamation plan. **Include page, section and drawing numbers as part of the description.**

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	☒ REPLACE	☐ REMOVE	PAP APPENDIX 6-5 Drilling and Sample Collection
☐ ADD	☐ REPLACE	☐ REMOVE	
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Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

APPENDIX 6-5

DRILLING AND SAMPLE COLLECTION

WEST SLURRY CELL AND COARSE REFUSE PILE
SUNNYSIDE COGENERATION ASSOCIATES
CARBON COUNTY, UTAH

APPENDIX 6-5

DRILLING AND SAMPLE COLLECTION

WEST SLURRY CELL AND COARSE REFUSE PILE
SUNNYSIDE COGENERATION ASSOCIATES
CARBON COUNTY, UTAH

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PROPOSED PLAN

Sunnyside Cogeneration Associates (SCA) submits this proposal to satisfy Permit Condition #18, R645-301 Rules, and Division Requirements to Characterize the Refuse Pile. The proposed plan includes drilling six soil borings, collecting soil samples, submitting selected samples for laboratory analysis, and preparing a technical report. The purpose of the plan is to assess whether materials in and immediately under the west slurry cell and coarse refuse pile (slurry and coarse refuse), at the Sunnyside Cogeneration Facility, Carbon County, Utah (Figure 1), are considered potentially toxic- and/or acid-forming. Information gathered from this proposed plan will assist in determining the appropriate methods for reclamation as required by R645-301 and R645-302.

In order to assess whether materials in and beneath the west slurry cell and coarse refuse area are considered potentially acid- and/or toxic-forming, SCA proposes the following:

(1) Drill five soil borings (B-1 through B-5) in the west slurry cell, collect soil samples, and record detailed logs.
(2) Drill one soil boring (B-6) near the bottom of the coarse refuse lifts, and if an adequate quantity of water is encountered, convert it to a small diameter monitor well to monitor water quality on top of the Mancos Shale in that area.
(3) Submit samples from Boreholes B-1 and B-2 and from the underlying material in B-4 and B-6 for analysis as identified under "Sampling Plan" below.
(4) Air dry and retain samples from Boreholes B-3, B-4, B-5, and ~~/ or~~ B-6.
(5) Compare boring logs and analytical results with information available from the John T. Boyd Drilling of 1991 and 1992.
(6) Identify potentially acid- and/or toxic-forming strata down to and including the stratum immediately below the refuse material.
(7) Quantify the material identified in #6 above that may require special reclamation considerations.
(8) Prepare a technical report outlining the findings of this plan.

The schedule under which this study will be conducted is presented in Appendix C.

BACKGROUND

Three major drilling investigations were performed on the refuse pile to examine the quantity and quality of the refuse material for use at SCA's electric generating station. Applied Hydrology Associates, Inc. performed their investigation in 1987. John T. Boyd Company (JTBC) performed two investigations, one in 1991 and 1992. In September 1992, JTBC was retained to perform an evaluation of the quantity and quality of fuel material in the Sunnyside Coal refuse pile in the vicinity of the west slurry cell. Numerous exploratory borings were drilled to collect samples for BTU analysis. Duplicate samples were collected, but subsequently misplaced at the analytical laboratory.

The State of Utah-DOGM requires a minimum 4 feet thick cap be placed over acid- or toxic-forming substances in the west slurry cell in order to properly reclaim the cell. However, a cap of less than four feet can be utilized if the underlying materials are shown to be non-toxic and non acid-forming. Sunnyside Cogeneration Association will propose using less than four feet of capping material for reclamation if the results from this study show that the materials exposed at the time of reclamation will not be toxic- or acid-forming.

The criteria used to determine if less than four feet can be used are outlined in the State of Utah - DOGM's, Guideline for Management of Topsoil and Overburden for Underground and Surface Coal Mining, ("Guideline"). According to the "guideline," representative samples should be collected and analyzed for specific parameters to determine if the underlying materials are considered to be acid- and/or toxic-forming. However, because the duplicate samples collected during the fuel evaluation were misplaced at the analytical laboratory, it is necessary to recollect samples of the west slurry cell.

SATISFACTION OF THE R645-301 REGULATIONS

Rule Citation: 645-301-553.252. Following final grading of the refuse pile, the coal mine waste will be covered with a minimum of four feet of the best available, non-toxic and non-combustible material, in a manner that does not impede drainage from the underdrains. The Division may allow less than four feet of cover material based on physical and chemical analyses which show that the requirements of R645-301-244.200 and R645-301-353 through R645-301-357.

Discussion: The six boreholes will provide a look at the material within and under the refuse pile. Physical analyses of all boreholes and chemical analysis of selected boreholes will be performed to show that the requirements of R645-301-244.200 and R645-301-353 through R645-301-357 can be met.

Rule Citation: R645-301-553.300. Exposed coal seams, acid- and toxic-forming materials, and combustible materials exposed, used or produced during mining will be adequately covered with non-toxic and non-combustible materials, or treated, to control the impact on surface and ground water in accordance with R645-301-731.100 through R645-301-731.522 and R645-301-731.800, to prevent sustained combustion, and to minimize adverse effects on plant growth and the approved post-mining land use.

Discussion: The chemical analyses to be performed on the selected samples will determine which of the materials, if any, are acid- and/or toxic-forming. The information obtained will assist in determining adequate management of these materials to control the impact on surface and ground water, prevent sustained combustion, and to minimize adverse effects on plant growth and the approved post-mining land use.

Rule Citation: R645-301-623. Each application will include geologic information in sufficient detail to assist in: 623.100. Determining all potentially acid- or toxic-forming strata down to and including the stratum immediately below the coal seam to be mined; 623.200. Determining whether reclamation as required by R645-301 and R645-302 can be accomplished.

Discussion: The boreholes will be drilled sufficiently into the stratum immediately below the refuse pile to collect samples of the material for analysis. The selected samples will be analyzed for acid- or toxic-forming potential. Information gathered will assist in an assessment of the reclamability of the material.

Rule Citation: R645-301-624.200. . . . For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, samples will be collected and analyzed from test borings; drill cores; or fresh, unweathered, uncontaminated samples from rock outcrops down to and including the deeper of either the stratum immediately below the lowest coal seam to be mined or any aquifer below the lowest coal seam to be mined which may be adversely impacted by mining.

Discussion: Samples from the drilling program will be collected and analyzed from test boring as required in 624.200. Efforts will be made to expedite the process between sampling and analysis. The analysis is expected to assist in identifying the strata that may contain acid- and/or toxic-forming materials and will include analysis of sulfur. If adequate water is encountered in B-6, a water quality sample will be analyzed. Computer models will be used to assist in quantifying the material underlying the refuse that may require special reclamation considerations.

Permit Condition #18: The permittee must . . . conduct additional analyses, for the purposes of determining the acid and/or toxic and alkalinity forming potential of the existing slurry ponds and coarse refuse pile material. The commitment must include the analysis of all the constituents outlined in the Division's Guidelines for the Management of Topsoil and Overburden, Table 6. The permittee must also specify the sample site locations to be selected . . .

In addition . . . the permittee must submit plans and laboratory results, for inclusion in the PAP, from the above sampling of the refuse and slurry material. Plans must include a discussion of the potential for, and mitigation of, water quality impacts and or revegetation problems attendant to re-excavation and disposal of the coal refuse material.

Discussion: This proposed plan identifies the locations of boreholes to be drilled and selected samples to be analyzed for the purposes of determining the acid and/or toxic and alkalinity forming potential of the refuse material. The analysis identified herein includes all the constituents outlined in the Division's Guidelines for the Management of Topsoil and Overburden, Table 6. This analysis will satisfy Permit Condition #18. Following completion of the proposed work, a technical report will be prepared, for inclusion in the PAP, and will include an analysis of the data, logs of soil boring, analytical results, findings, discussion and summary. The PAP will be revised, if needed, to include a discussion of the potential for, and mitigation of, water quality impacts and/or revegetation problems attendant to re-excavation and disposal of the coal refuse material.

SOIL BORING

The proposed soil borings (B-1 through B-5) have been carefully placed in an attempt to increase the possibility of encountering a suspected contaminated soil layer underlying the refuse and identifying the typical variations in thickness of this layer. The proposed borings are spaced throughout the slurry cell to attempt to characterize the subsurface with a minimum number of borings, while still maximizing data.

Proposed soil boring B-6 is located near the bottom of the coarse refuse lifts. This boring will be drilled to the top of the Mancos Shale, in the vicinity of an erosional valley, in an attempt to construct a groundwater monitor well. The purpose of the monitor well is to attempt to measure the quality of water that may be perched on top of the Mancos Shale, and flowing in the erosional valley.

The locations of the proposed borings (B-1 through B-6) are shown on Figure 2. Each soil boring will be drilled into the stratum immediately below the refuse material. The terminal depths of the borings are expected to be between 50 and 200 feet below grade. The drilling of the borings will be supervised and logged by a qualified geologist.

The soil borings will be drilled using a percussion hammer-reverse circulation rig. The percussion hammer rig uses a 9 7/8 inch diameter dual wall threaded casing that is driven along with the bit as drilling progresses. Each section of drill pipe is 10 feet long, and is connected to each other; this permits a continuous casing to line the bore hole which helps prevent caving and sloughing, which could result in possible cross-contamination within the bore hole. Because of the nature and size of the unconsolidated materials being drilled, and the depths of the borings, the percussion hammer rig was selected as the preferred drilling method for this project. A standard operating procedure (SOP) for percussion hammer drilling is included in Appendix A.

Upon completion of the drilling, the open bore holes not used for monitor well completion, will be abandoned using bentonite chips to fill the bore hole. The bentonite chips are hydrated to form a tight seal within the bore hole. This aids in the prevention of potential materials or drainage from migrating downward.

SAMPLING PLAN

West Slurry Cell and Coarse Refuse

Soil samples will be collected from each boring every ten feet as drilling progresses. The soil samples will be collected using a 5-gallon plastic pail as the cuttings are discharged from the drilling rig's cyclone. The soil sample will be divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place.

The ~~selected~~ samples from boreholes B-1 and B-2 will be sent directly to the laboratory (one composite sample per 20-feet in the refuse material, ~~one sample per five feet of the underlying soil material~~) and analyzed for the parameters listed in Appendix B. The other samples will be air dried and retained for future reference for a period of up to six months or until no longer needed. All samples taken will be examined by a qualified geologist to identify physical characteristics.

~~Samples from B-3 through B-6 will be compared with those encountered in B-1 and B-2. Samples which appear to have similar physical characteristics will be assumed to have similar chemical characteristics and will not need to be analyzed.~~

All of the samples taken from boreholes B-3 through B-6 will be retained. Efforts will be made to review the analyses from B-1 and B-2 as quickly as possible ~~and determine if any samples from B-3 through B-6 will need to be analyzed for a few specific parameters~~. After review of the physical characteristics, chemical analyses and the bore logs, consideration will be given to as to whether any analysis of specific samples from boreholes B-3 through B-6 is warranted. Additional samples from B-3 through B-6 will only be analyzed if materials are encountered which, ~~have substantially different physical characteristics and are suspected~~ because of their differing physical characteristics and/or suspected differences in chemical composition, are expected to require special reclamation considerations.

The soil samples to be analyzed will be sent under chain of custody to a Utah State or EPA Certified soils laboratory for analysis of the parameters identified in Appendix B, using the methodologies in accordance with the DOGM's guideline, Table 6.

Soil Layer Underlying The Refuse Material

Located on the southern slope of the east slurry cell is an orange-yellow layer that has cropped out in isolated spots. In an attempt to quantify the presence, areal extent, and composition of the suspected interfacial material, in-situ soil samples will be collected while drilling, if the suspected interfacial layer is encountered. Soil samples will be collected every 5-feet while drilling progresses through this layer. These samples will be analyzed as described below and in Appendix B.

The soil samples will be collected by advancing a 2-inch diameter, 24-inch long split-barrel sample tube, that contains brass liners, into the undisturbed soil beyond the bottom of the drill casing. After the drill casing reaches the proposed sampling depth, the sample tube is driven 24 inches using a 140 lb hammer that is dropped from a height of 30 inches. The collected soil sample will be divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place.

The ~~selected~~ samples of the underlying interfacial material from boreholes B-1, B-2, B-4 and B-6 will be sent directly to the laboratory (~~one sample per 20 feet in the refuse material,~~ one sample per five feet of the underlying interfacial soil material) and analyzed for the parameters listed in Appendix B. All samples not sent for analysis will be air dried and retained for future reference for a period of up to six months or until no longer needed. The soil samples will be sent under chain of custody to a Utah State or EPA Certified Soils Laboratory for chemical analysis.

At the analytical laboratory, the soil samples collected from the underlying soil layer will be prepared for analysis using the following techniques:

1) air drying the samples for 24-hours;
2) mechanically grinding the samples in order to pass through a 2-mm (10-mesh) stainless steel sieve;
3) saturate ~~mixing~~ the ground samples with deionized water with an electrical conductivity of $\leq$ 2 mmhos/cm, cover with an airtight lid, and allow to sit 24 hours to establish an equilibrium between the soil and water;
4) the liquid will then be collected for the requested analyses.

An extract, of the collected liquid, will be analyzed for the parameters outlined in Appendix B. The parameters to be analyzed and laboratory methodologies were agreed upon by DOGM at a meeting on February 2, 1994.

In addition to the analyses listed in Appendix B for the liquid extract portion, one sample for each five-foot increment from B-1, ~~and one from~~ B-2, B-4 and B-6 collected from the underlying layer will be analyzed for total arsenic, total cadmium, total chromium, and total selenium.

According to Mr. Don Verbica of the State of Utah-Division of Solid and Hazardous (DSHW), to estimate if a known (total) concentration of a metal might be near its respective TCLP-MCL, a factor of 20 times the TCLP-MCL for water may be used as an upper (total) MCL. If the total concentration for a collected soil sample exceeds 20 times the TCLP-MCL for water, for the metal in question, then a TCLP analysis will be performed on the sample which had a high metals concentration.

POSSIBLE MONITOR WELL CONSTRUCTION - Borehole B-6

Two alternatives are proposed for construction of a monitoring well in Borehole B-6; the design utilized will be based on the subsurface conditions at the time of drilling. If a perched water bearing zone of sufficient thickness is encountered on the surface of the Mancos Shale, a groundwater monitor well will be constructed as shown on Figure 3. If a perched water bearing zone of sufficient thickness is not encountered, the groundwater monitor well will be constructed as shown on Figure 4. The design shown on Figure 4 will permit water, that may be flowing on top of the Mancos Shale, to collect in the bottom of the casing, so a water sample can be collected for analysis. If insufficient water is encountered in B-6 to ensure the success of a monitoring well installation, no well will be constructed.

The monitor well is designed to be constructed with 2-inch diameter threaded, factory perforated and blank, schedule-40 PVC pipe. The screened interval is above the upper surface of the Mancos Shale. The precise length of the screened portion is dependent on the thickness of the water bearing zone encountered. The screened portion of the monitor well will consist of at least 2.5 feet of 0.010-inch slot, that is wrapped by a knitted polyester filter sock, designed to help prevent coal fines in the subsurface from entering the well screen. A threaded PVC cap is fastened to the bottom of the casing, solvents or cements are not used. The well casing is thoroughly washed and steam-cleaned prior to installation.

After setting the casing inside the bore hole, #30 silica sand is tremied or poured into the annular space from the bottom of the boring to 2 feet above the perforated interval. A 5 foot thick bentonite plug is placed above the filter material to prevent grout from infiltrating into the filter material. A type I/II portland cement mixture with 5% bentonite is tremied into the annular space from the top of the bentonite plug to the ground surface. A steel stove pipe is set over the wellhead and cemented into place.

Upon completion of the new monitor well, the top-of-casing (TOC) will be surveyed to mean-sea-level (MSL), relative to a known elevation benchmark. The monitor well will be developed by the drilling contractor using a submersible pump and/or airlift techniques until relatively clear, sand/silt free water is produced.

Monitor well sampling

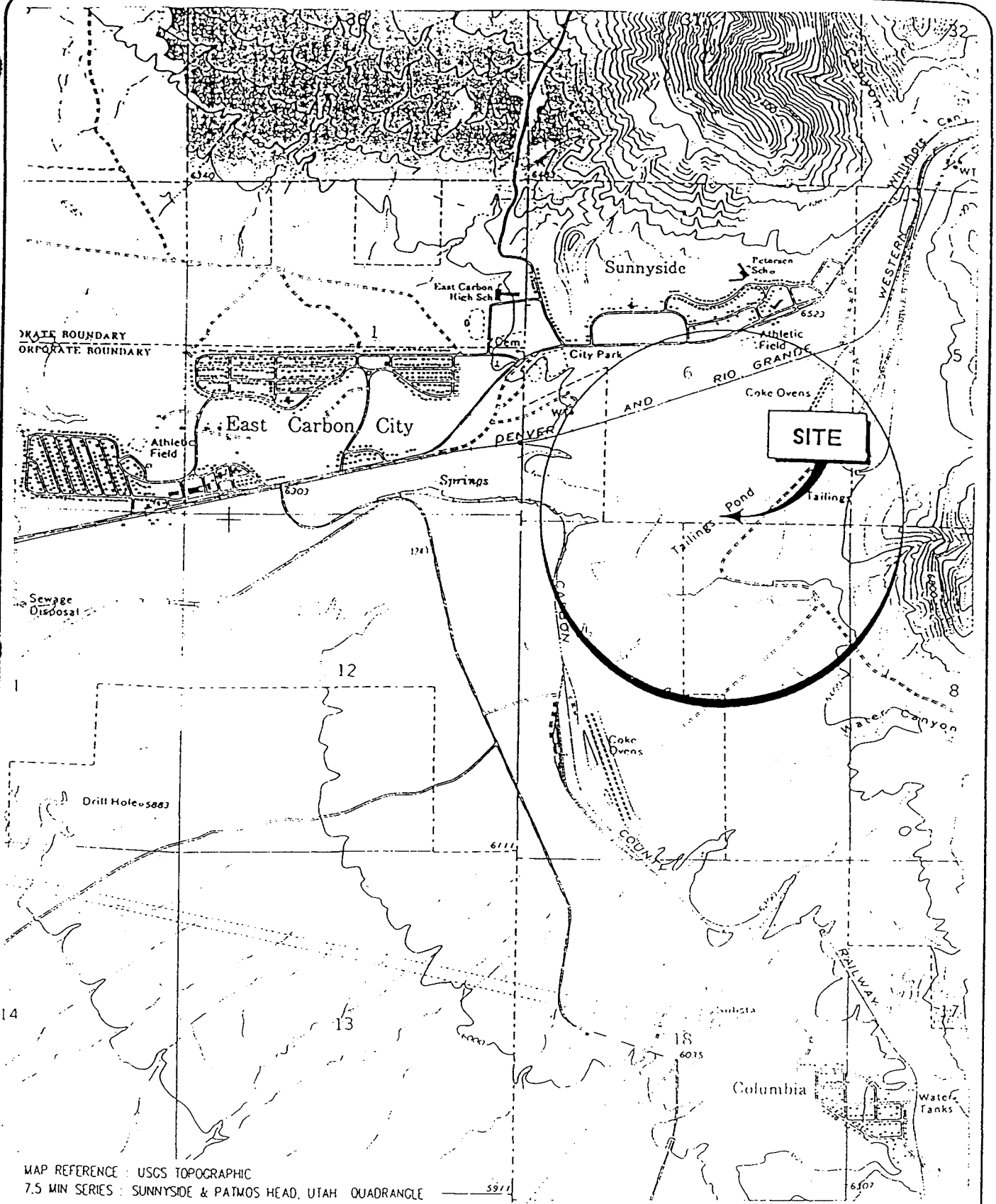
If adequate water is encountered, a representative water sample will be collected from the newly installed monitor well. A SOP for groundwater monitoring is presented in Appendix A. During purging and sampling of the monitor well, pH, temperature, specific conductivity, and dissolved oxygen will be measured and recorded. The collected water sample will be shipped under chain-of custody to a Utah State or EPA certified laboratory for analysis. The water sample will be analyzed for the parameters outlined in Appendix B using the appropriate EPA method.

If adequate water is encountered while drilling boreholes B-1 through B-5, a water sample will be collected and analyzed as listed in Appendix B. However, because of mining operations anticipated in the area, monitoring wells will not be constructed in any of the boreholes B-1 through B-5.

TECHNICAL REPORT

Following completion of the proposed work, a technical report will be prepared, for inclusion in the PAP, and will include an analysis of the data, logs of soil boring, analytical results, findings, discussion and summary. The PAP will be revised, if needed, to include a discussion of the potential for, and mitigation of, water quality impacts and/or revegetation problems attendant to re-excavation and disposal of the coal refuse material in the excess spoil area.

FIGURES

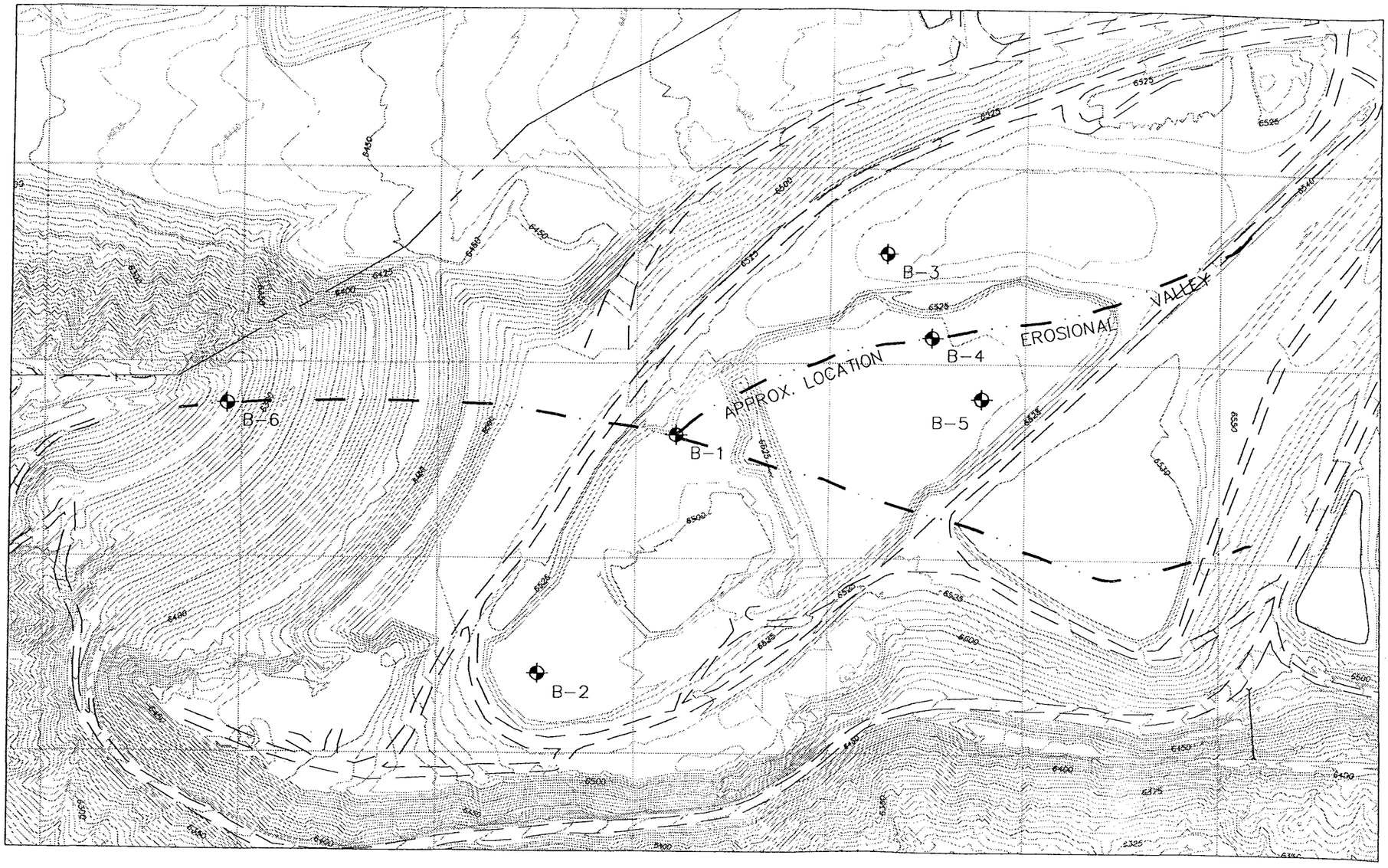


ECKHOFF WATSON AND PREATOR ENGINEERING

ENGINEERS PLANNERS SURVEYORS

FIGURE 1

SITE LOCATION MAP
SUNNYSIDE COGENERATION FACILITY
CARBON, COUNTY, UTAH



GRAPHIC SCALE

300 0 150 300 600

(IN FEET)
1 inch = 300ft.

LEGEND

- PERMIT BOUNDARY
- EROSIONAL VALLEY
- ROAD
- B-1 PROPOSED BORING LOCATION

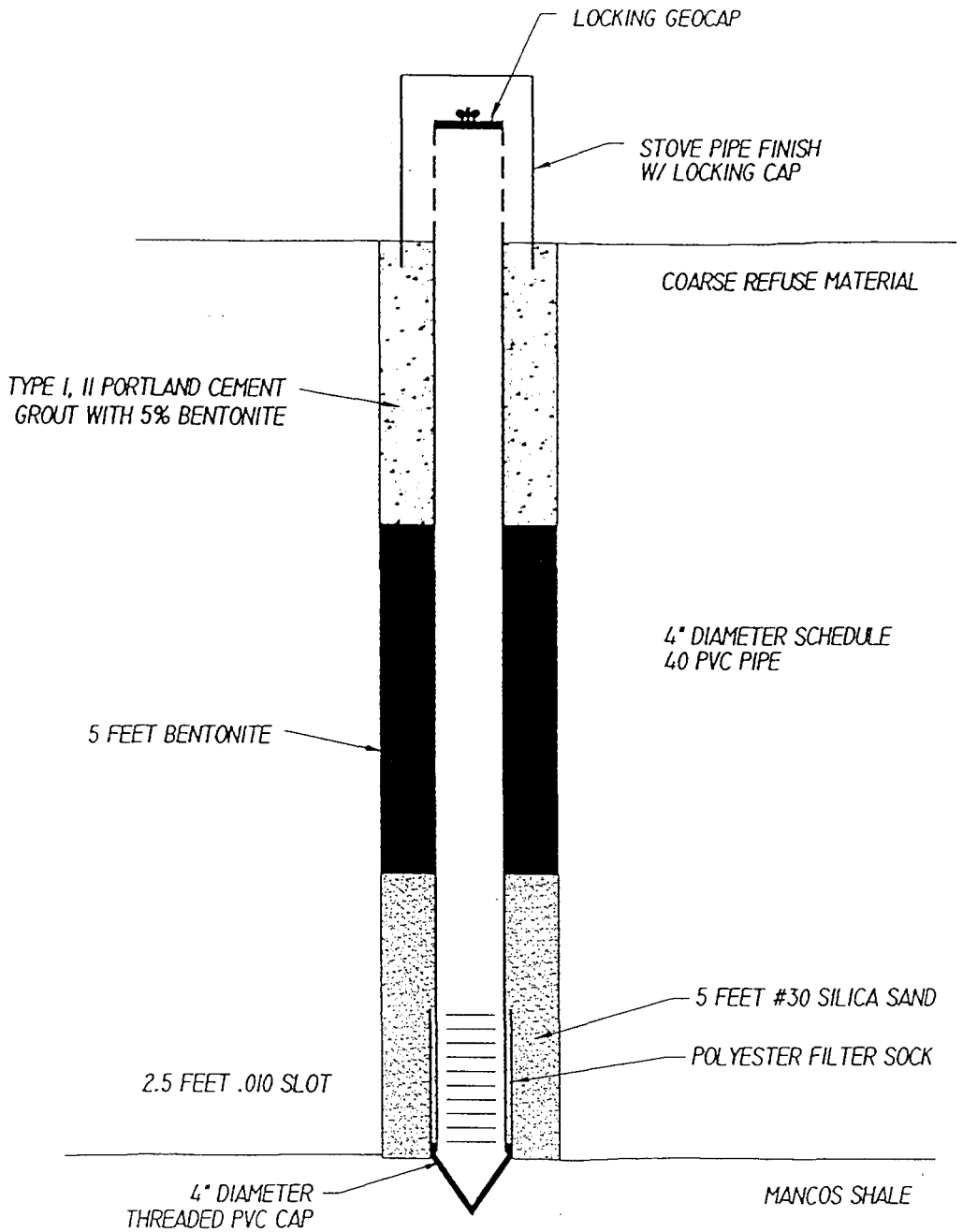
No.	Revision	By	Date
1	REV BORING LOCATIONS	AH	3/95

Project Number EC450593
Designed By AEB
Drawn By AH
Checked By AEB Date 2/94

ECKHOFF WATSON AND PREATOR ENGINEERING
ENGINEERS PLANNERS SURVEYORS SALT LAKE CITY

SUNNYSIDE COGENERATION ASSOCIATES
SUNNYSIDE COGENERATION FACILITY, CARBON COUNTY, UTAH
PROPOSED BORING LOCATIONS

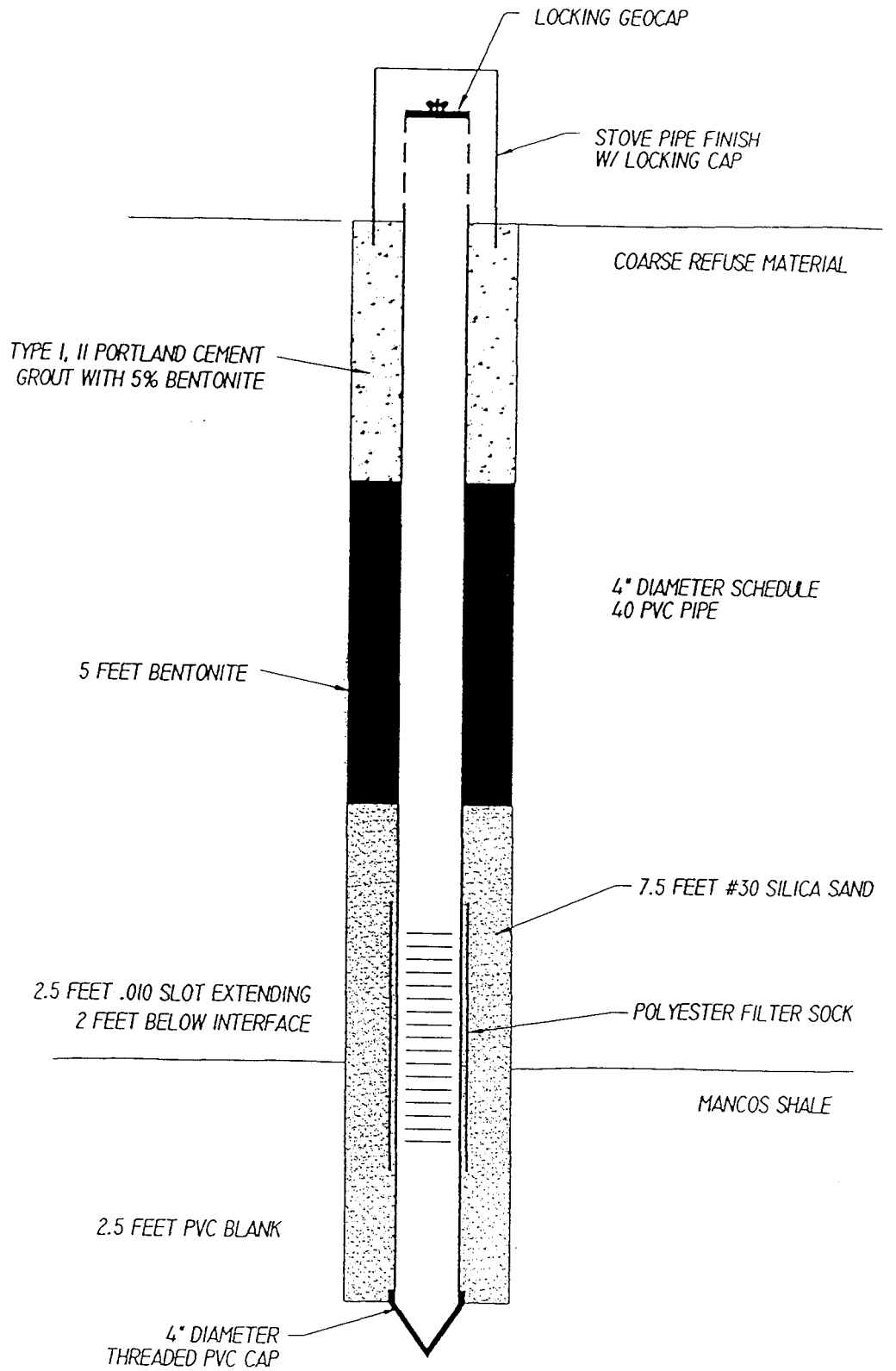
2



ECKHOFF WATSON AND PREATOR ENGINEERING
ENVIRONMENTAL SCIENCES DIVISION

FIGURE 3

SCHEMATIC #1 OF WELL CONSTRUCTION
SUNNYSIDE COGENERATION FACILITY
SUNNYSIDE, UTAH



ECKHOFF WATSON AND PREATOR ENGINEERING
ENVIRONMENTAL SCIENCES DIVISION

FIGURE 4

SCHEMATIC #2 OF WELL CONSTRUCTION
SUNNYSIDE COGENERATION FACILITY
SUNNYSIDE, UTAH

APPENDIX A
STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE

RE: PERCUSSION HAMMER - DUAL WALL REVERSE CIRCULATION DRILLING AND SOIL SAMPLING

The percussion hammer - reverse circulation rig uses a 9-7/8 inch diameter dual wall threaded casing that is driven along with the bit as drilling progresses. Each section of drill pipe is 10 feet long, and is connected to each other; this permits a continuous casing to line the bore hole which helps prevent caving and sloughing, which could result in possible cross-contamination within the bore hole. Drill cuttings are discharged through a cyclone that is mounted on the side of the drilling rig. Prior to drilling and soil sampling, all drilling and sampling equipment is steam-cleaned.

During drilling, a geologist, under supervision of a professional engineer or registered geologist, continuously logs each bore hole and collects soil samples. Each soil sample is examined and logged based on soil type, color, consistency or density of soil, moisture condition, any obvious staining, odor, and other field observations. Soil samples are collected by a State of Utah - Certified Soil and Groundwater Sampler.

In-situ soil samples are collected by advancing a split-spoon sampler that contains brass liners into the undisturbed soil beyond the tip of the casing. After the bit and casing reaches the proposed sampling depth, the sampling tube is driven 18 or 24 inches, depending on the length of the sampler, using a 140 lb hammer dropped from a height of 30 inches. The collected soil sample is divided into two parts and transferred from the brass liners to 1-gallon plastic zip-lock bag, sealed shut with the excess air expelled, properly labeled, and stored in a cool dry place. One part of the sample will be delivered or shipped under chain-of-custody to the analytical laboratory for chemical analysis, the other part of the sample will be retained for future reference.

Composite grab soil samples are collected using a clean 5-gallon plastic pail as the cuttings are discharged from the drilling rig's cyclone. The composite grab soil samples are divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place. One part of the sample will be delivered or shipped under chain-of-custody to the analytical laboratory for chemical analysis, the other part of the sample will be retained for future reference.

After collection of each soil sample, the sampling equipment is cleaned with a non-phosphatic detergent solution, and rinsed with clean water. Between each successive soil boring, all drilling and sampling equipment is steam-cleaned to help prevent cross-contamination.

STANDARD OPERATING PROCEDURE

RE: GROUNDWATER SAMPLING PROCEDURES

Upon arrival at a site, all sampling equipment is decontaminated by steam cleaning. Each well to be sampled is checked for the presence of free product using a clear bailer. SWL and TD measurements for the wells to be sampled are used to determine a calculated three-casing purge volume. Water is purged from 4-inch diameter wells using a submersible pump. 2-inch diameter wells are purged using a submersible pump or by hand bailing. Several rounds of water temperature, pH, and electric conductance measurements are often made in the course of purging. Equipment is removed from the well after the calculated purge volume is obtained or the well is pumped dry. Once sufficient recharge of the well has occurred, a sample is collected from the well using a stainless steel or disposable bailer. The water sample is retained in an appropriate container with preservative added, labeled appropriately, and stored on ice. The samples are then transported to a Utah State or EPA certified laboratory for analysis with complete chain-of-custody documentation. Sampling equipment is steam cleaned between wells and all contaminated purge water is contained in a 55-gallon drum(s).

APPENDIX B
LABORATORY ANALYSIS

Laboratory Analysis - West Slurry Cell and Coarse Refuse Material

PARAMETER	SUGGESTED METHODS
• pH	ASA Mono. No. 9, Part 2, (2 ed), 1982. Method 10-3.2, page 171. Perform pH on saturated paste.
• Electrical Conductivity	ASA Mono. Nop. 9, Part 2 (2 ed), 1982. Method 10-3.3, pages 172-173
• Saturation Percentage	SP=100 (total wt of water)/(wt of oven-dry soil).
• Particle Size Analysis (% sand, silt, clay)	Hydrometer method. Black et al. 1965. Methods of soil analysis. ASA Mono No. 9, Part 1, method 43-5, pgs 562-566
• Soluble Ca, Mg, and Na	ASA Mono. No. 9, Part 2, (2ed), 1982, Method 10-3.4. pages 173-174.
• Sodium Adsorption Ration	$[Na^+]/([Ca^{2+} + Mg^{2+}]/2)^{0.5}$
• Selenium	Extraction by ASA Mono. No.9, Part 2 (1 ed), 1965. Method 80-3.2, page 1122. Analyze by hydride generation for AA or ICP. ASA Mono. No. 9, Part 2 (2ed), 1982. Method 3-5.5, pages 59-61.
• Total N	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 31-3, pages 610-616.
• Nitrate-N	ASA Mono. No. 9, Part 2 (2 ed), 1982. Methods 33-4.1, pages 643-645; 33-8.3, pages 679-682 or Sims J.R., and G.D. Jackson. 1977. Soil Sci. Soc. Am. Proc. 35:603-607.
• Boron	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 25-9.1, page 443 for extraction and Method 25-5, pages 443-446 for analysis.
• Maximum Acid Potential*	US EPA. 1978. EPA 600/2-78-054. Method 3.2.6, page 60.

Laboratory Analysis - West Slurry Cell and Coarse Refuse (Continued)

PARAMETER	SUGGESTED METHODS
• Neutralization Potential	US EPA. 1978. EPA 600/2-28-054. Method 3.2.3, page 47.
• Organic Carbon	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 29-3.5.3, pages 571-573.
• Exchangeable Sodium**	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 13-4.4, pages 238-241. Using Flame Emission and using extractatea in method 8-3, page 152.
• Available Water Capacity	USDA SCS Soil Survey Investigation report No. 1, Method 4c1, Page 24.
• Rock Fragments	USDA SCS Soil Survey Investigation report No. 1, Method 3B, Page 18.

* Percent sulfate-sulfur, percent pyritic-sulfur, and % total-sulfur will be determined in reference to the acid potential analysis.

** If the samples have a SAR greater than 12 for clay textured soils or greater than 15 for sandy textured soils, then exchangeable sodium % should be analyzed.

Laboratory Analyses - Suspected Contaminated Layer Underlying The Refuse Material

PARAMETER

1) VIA ATOMIC ABSORPTION

Selenium	Arsenic	Chromium	Nickel
Copper	Cadmium	Zinc	Lead
Molybdenum			

2) VIA ICP SPECTROMETRY

Aluminum	Iron	Cobalt	Manganese
Boron			

3) Alkalinity (CO_3^{2-}, HCO_3^{2-})
4) Exchangeable acidity
5) Chloride
6) Nitrate
7) Sulfate

Monitor Well - Water Sample Analysis

HCO_3^{2-}	CO_3^{2-}	Acidity	Hardness
Oil and Grease	BOD-5 day	TSS	TDS
Ammonia Nitrogen	Nitrite Nitrogen	Total Phenolics	Sulfate
Total Cyanide			

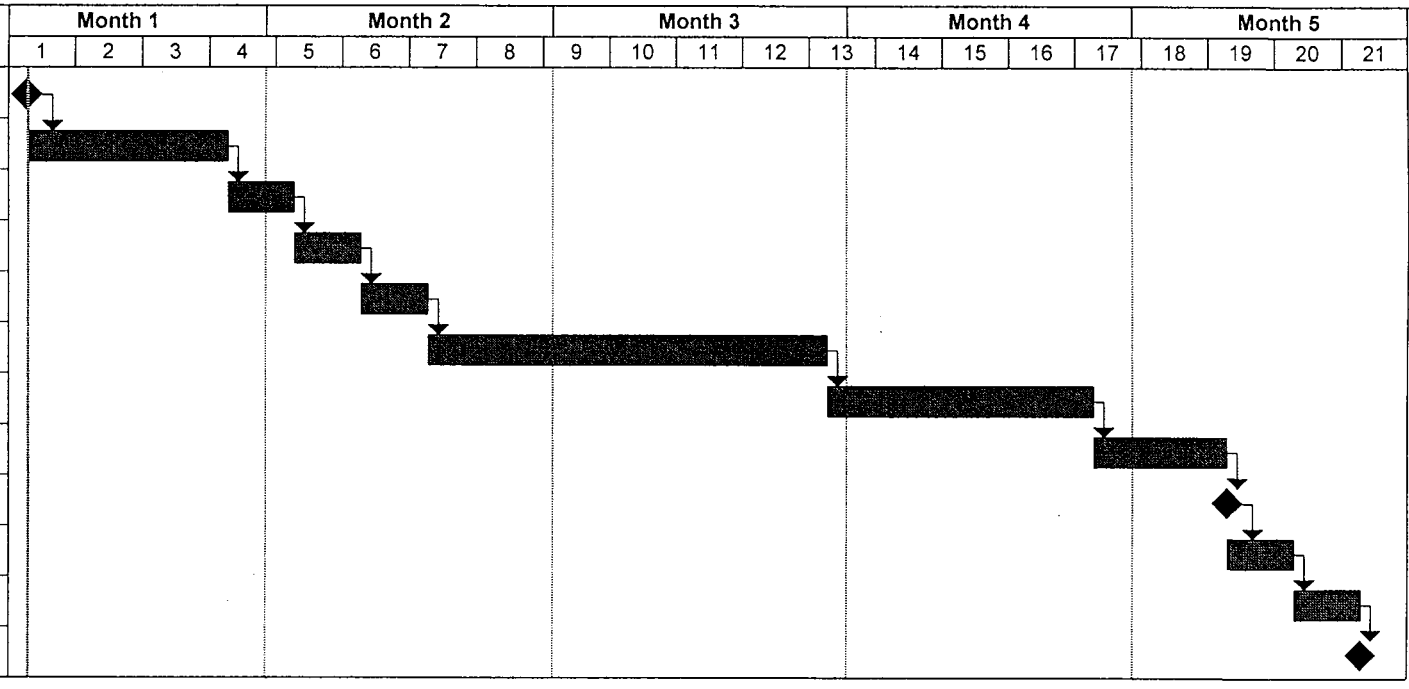
Total and Dissolved Metals

Arsenic	Cadmium	Copper	Lead
Mercury	Selenium	Molybdenum	Potassium
Sodium	Nickel	Aluminum	Boron
Iron	Calcium	Magnesium	Manganese

APPENDIX C
PROPOSED SCHEDULE

SUNNYSIDE COGENERATION ASSOCIATES
SCHEDULE
DRILLING, SAMPLING AND ANALYSIS OF ACID/TOXIC FORMING DATA

ID	Task Name
1	DOGM Review and Acceptance of Plan
2	Obtain Bids from Drillers & Labs
3	Select Drilling Contractor & Lab
4	Mobilization
5	Drilling
6	Testing
7	Analysis
8	Reporting
9	Draft Report to SCA for Review
10	SCA Review
11	Final Report
12	Submit to DOGM



SUNNYSIDE COGENERATION FACILITY
Sunnyside Operations Associates, L.P.
Post Office Box 10
East Carbon, Utah 84520
(801) 888-4476
(801) 888-2538 fax

April 10, 1995

Ms. Pamela Grubaugh-Littig
Division of Oil, Gas and Mining
3 Triad Center - Suite 350
Salt Lake City, Utah 84180-1203

RE: Permit No. ACT/007/035: Sunnyside Cogeneration Associates
Permit Submittal: NOV N93-13-2-1, Permit Condition #18
Engineer's Project No. EC450593

Dear Pam,

This submittal includes a revision to PAP Appendix 6-5 which details the plan for characterization of the Refuse Pile/West Slurry Cell to meet requirements of NOV N93-13-2-1, and Permit Condition #18. The revisions reflect the concepts as discussed and agreed in a meeting with Henry Sauer at DOGM on March 28, 1995. Please review these revisions as quickly as possible so that SCA can proceed with the work planned.

If you have any questions concerning this submittal, please feel free to call the SCA Plant Manager, at (801) 888-4476.

Sincerely,

Thomas G. Eckstein
Acting Plant Manager

TGE/lls

Attachments

c.c. Bob Evans, NRG
Jim O'Donnell, NRG
Doug Burnham, B&W
Alane E. Boyd, EWP
Brian Burnett, CNM
Bill Malencik, DOGM
Henry Sauer, DOGM
Joe Helfrich, DOGM (letter)

APPLICATION FOR PERMIT CHANGE

Title of Change: SUNNYSIDE COGENERATION ASSOCIATES
Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18
Plan for Characterization of the Refuse Pile/West Slurry Cell

Permit Number: ACT/007/035

Mine: Sunnyside Cogen. Assoc.

Permittee: Sunnyside Cogen. Assoc.

Description - include reason for change and timing required to implement: Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18; Plan for Characterization of the Refuse Pile/West Slurry Cell

☐ Yes	☒ No	1. Change in the size of the Permit Area? _____ acres ☐ increase ☐ decrease.
☐ Yes	☒ No	2. Change in the size of the Disturbed Area? _____ acres ☐ increase ☐ decrease.
☐ Yes	☒ No	3. Will permit change include operations outside the Cumulative Hydrologic Impact Area?
☐ Yes	☒ No	4. Will permit change include operations in hydrologic basins other than currently approved?
☐ Yes	☒ No	5. Does permit change result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes	☒ No	6. Does permit change require or include public notice publication?
☒ Yes	☐ No	7. Permit change as a result of a Violation? Violation # N93-13-2-1 , PERMIT CONDITION # 18
☐ Yes	☒ No	8. Permit change as a result of a Division Order? D.O. #
☐ Yes	☒ No	9. Permit change as a result of other laws or regulations? Explain:
☐ Yes	☒ No	10. Does permit change require or include ownership, control, right-of-entry, or compliance information?
☐ Yes	☒ No	11. Does the permit change affect the surface landowner or change the post mining land use?
☒ Yes	☐ No	12. Does permit change require or include collection and reporting of any baseline information?
☐ Yes	☒ No	13. Could the permit change have any effect on wildlife or vegetation outside the current disturbed area?
☐ Yes	☒ No	14. Does permit change require or include soil removal, storage or placement?
☐ Yes	☒ No	15. Does permit change require or include vegetation monitoring, removal or revegetation activities?
☐ Yes	☒ No	16. Does permit change require or include construction, modification, or removal of surface facilities?
☐ Yes	☒ No	17. Does permit change require or include water monitoring, sediment or drainage control measures?
☐ Yes	☒ No	18. Does permit change require or include certified designs, maps, or calculations?
☐ Yes	☒ No	19. Does permit change require or include underground design or mine sequence and timing?
☐ Yes	☒ No	20. Does permit change require or include subsidence control or monitoring?
☐ Yes	☒ No	21. Have reclamation costs for bonding been provided or revised for any change in the reclamation plan?
☐ Yes	☒ No	22. Is permit change within 100 feet of a public road or perennial stream or 500 feet of an occupied dwelling?
☐ Yes	☒ No	23. Is this permit change coal exploration activity ☐ inside ☐ outside of the permit area? N/A

☒ **Attached 3 complete copies of proposed permit change as it would be incorporated into the Mining and Reclamation Plan.**

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all aspects with the laws of Utah in reference to commitments, undertakings, and obligations herein.

Signed - Name - Position - Date: E. Boyd, P.E. 4/10/95

Subscribed and sworn to before me this 10th day of April, 19 95

Notary Public

My Commission Expires: 3/8/97, 19____

Attest: STATE OF Utah)
COUNTY OF Salt Lake) ss:

NOTARY PUBLIC
MARILYN YOUNG
1121 E. 3300 S. #246
Salt Lake City, Utah 84106
My Commission Expires
3/8/97
STATE OF UTAH

RECEIVED
APR 12 1995
DIV OF OIL, GAS & MINING
ASSIGNED PERMIT CHANGE NUMBER

Application for Permit Change
Detailed Schedule of Changes to the Permit

Title of Change: SUNNYSIDE COGENERATION ASSOCIATES
Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18
Plan for Characterization of the Refuse Pile/West Slurry Cell

Permit Number: ACT/007/035

Mine: Sunnyside Cogen. Assoc.

Permittee: Sunnyside Cogen. Assoc.

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit change. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages or other information as needed to specifically locate, identify and revise the exiting mining and reclamation plan. **Include page, section and drawing numbers as part of the description.**

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	☒ REPLACE	☐ REMOVE	PAP APPENDIX 6-5 Drilling and Sample Collection
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
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Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

APPENDIX 6-5

DRILLING AND SAMPLE COLLECTION

WEST SLURRY CELL AND COARSE REFUSE PILE
SUNNYSIDE COGENERATION ASSOCIATES
CARBON COUNTY, UTAH

APPENDIX 6-5

DRILLING AND SAMPLE COLLECTION

WEST SLURRY CELL AND COARSE REFUSE PILE
SUNNYSIDE COGENERATION ASSOCIATES
CARBON COUNTY, UTAH

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Figure 3 - Schematic #1 of Well Construction
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PROPOSED PLAN

Sunnyside Cogeneration Associates (SCA) submits this proposal to satisfy Permit Condition #18, R645-301 Rules, and Division Requirements to Characterize the Refuse Pile. The proposed plan includes drilling six soil borings, collecting soil samples, submitting selected samples for laboratory analysis, and preparing a technical report. The purpose of the plan is to assess whether materials in and immediately under the west slurry cell and coarse refuse pile (slurry and coarse refuse), at the Sunnyside Cogeneration Facility, Carbon County, Utah (Figure 1), are considered potentially toxic- and/or acid-forming. Information gathered from this proposed plan will assist in determining the appropriate methods for reclamation as required by R645-301 and R645-302.

In order to assess whether materials in and beneath the west slurry cell and coarse refuse area are considered potentially acid- and/or toxic-forming, SCA proposes the following:

(1) Drill five soil borings (B-1 through B-5) in the west slurry cell, collect soil samples, and record detailed logs.
(2) Drill one soil boring (B-6) near the bottom of the coarse refuse lifts, and if an adequate quantity of water is encountered, convert it to a small diameter monitor well to monitor water quality on top of the Mancos Shale in that area.
(3) Submit samples from Boreholes B-1 and B-2 and from the underlying material in B-4 and B-6 for analysis as identified under "Sampling Plan" below.
(4) Air dry and retain samples from Boreholes B-3, B-4, B-5, and ~~/ or~~ B-6.
(5) Compare boring logs and analytical results with information available from the John T. Boyd Drilling of 1991 and 1992.
(6) Identify potentially acid- and/or toxic-forming strata down to and including the stratum immediately below the refuse material.
(7) Quantify the material identified in #6 above that may require special reclamation considerations.
(8) Prepare a technical report outlining the findings of this plan.

The schedule under which this study will be conducted is presented in Appendix C.

BACKGROUND

Three major drilling investigations were performed on the refuse pile to examine the quantity and quality of the refuse material for use at SCA's electric generating station. Applied Hydrology Associates, Inc. performed their investigation in 1987. John T. Boyd Company (JTBC) performed two investigations, one in 1991 and 1992. In September 1992, JTBC was retained to perform an evaluation of the quantity and quality of fuel material in the Sunnyside Coal refuse pile in the vicinity of the west slurry cell. Numerous exploratory borings were drilled to collect samples for BTU analysis. Duplicate samples were collected, but subsequently misplaced at the analytical laboratory.

The State of Utah-DOGM requires a minimum 4 feet thick cap be placed over acid- or toxic-forming substances in the west slurry cell in order to properly reclaim the cell. However, a cap of less than four feet can be utilized if the underlying materials are shown to be non-toxic and non acid-forming. Sunnyside Cogeneration Association will propose using less than four feet of capping material for reclamation if the results from this study show that the materials exposed at the time of reclamation will not be toxic- or acid-forming.

The criteria used to determine if less than four feet can be used are outlined in the State of Utah - DOGM's, Guideline for Management of Topsoil and Overburden for Underground and Surface Coal Mining, ("Guideline"). According to the "guideline," representative samples should be collected and analyzed for specific parameters to determine if the underlying materials are considered to be acid- and/or toxic-forming. However, because the duplicate samples collected during the fuel evaluation were misplaced at the analytical laboratory, it is necessary to recollect samples of the west slurry cell.

SATISFACTION OF THE R645-301 REGULATIONS

Rule Citation: 645-301-553.252. Following final grading of the refuse pile, the coal mine waste will be covered with a minimum of four feet of the best available, non-toxic and non-combustible material, in a manner that does not impede drainage from the underdrains. The Division may allow less than four feet of cover material based on physical and chemical analyses which show that the requirements of R645-301-244.200 and R645-301-353 through R645-301-357.

Discussion: The six boreholes will provide a look at the material within and under the refuse pile. Physical analyses of all boreholes and chemical analysis of selected boreholes will be performed to show that the requirements of R645-301-244.200 and R645-301-353 through R645-301-357 can be met.

Rule Citation: R645-301-553.300. Exposed coal seams, acid- and toxic-forming materials, and combustible materials exposed, used or produced during mining will be adequately covered with non-toxic and non-combustible materials, or treated, to control the impact on surface and ground water in accordance with R645-301-731.100 through R645-301-731.522 and R645-301-731.800, to prevent sustained combustion, and to minimize adverse effects on plant growth and the approved post-mining land use.

Discussion: The chemical analyses to be performed on the selected samples will determine which of the materials, if any, are acid- and/or toxic-forming. The information obtained will assist in determining adequate management of these materials to control the impact on surface and ground water, prevent sustained combustion, and to minimize adverse effects on plant growth and the approved post-mining land use.

Rule Citation: R645-301-623. Each application will include geologic information in sufficient detail to assist in: 623.100. Determining all potentially acid- or toxic-forming strata down to and including the stratum immediately below the coal seam to be mined; 623.200. Determining whether reclamation as required by R645-301 and R645-302 can be accomplished.

Discussion: The boreholes will be drilled sufficiently into the stratum immediately below the refuse pile to collect samples of the material for analysis. The selected samples will be analyzed for acid- or toxic-forming potential. Information gathered will assist in an assessment of the reclamability of the material.

Rule Citation: R645-301-624.200. . . . For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, samples will be collected and analyzed from test borings; drill cores; or fresh, unweathered, uncontaminated samples from rock outcrops down to and including the deeper of either the stratum immediately below the lowest coal seam to be mined or any aquifer below the lowest coal seam to be mined which may be adversely impacted by mining.

Discussion: Samples from the drilling program will be collected and analyzed from test boring as required in 624.200. Efforts will be made to expedite the process between sampling and analysis. The analysis is expected to assist in identifying the strata that may contain acid- and/or toxic-forming materials and will include analysis of sulfur. If adequate water is encountered in B-6, a water quality sample will be analyzed. Computer models will be used to assist in quantifying the material underlying the refuse that may require special reclamation considerations.

Permit Condition #18: The permittee must . . . conduct additional analyses, for the purposes of determining the acid and/or toxic and alkalinity forming potential of the existing slurry ponds and coarse refuse pile material. The commitment must include the analysis of all the constituents outlined in the Division's Guidelines for the Management of Topsoil and Overburden, Table 6. The permittee must also specify the sample site locations to be selected . . .

In addition . . . the permittee must submit plans and laboratory results, for inclusion in the PAP, from the above sampling of the refuse and slurry material. Plans must include a discussion of the potential for, and mitigation of, water quality impacts and or revegetation problems attendant to re-excavation and disposal of the coal refuse material.

Discussion: This proposed plan identifies the locations of boreholes to be drilled and selected samples to be analyzed for the purposes of determining the acid and/or toxic and alkalinity forming potential of the refuse material. The analysis identified herein includes all the constituents outlined in the Division's Guidelines for the Management of Topsoil and Overburden, Table 6. This analysis will satisfy Permit Condition #18. Following completion of the proposed work, a technical report will be prepared, for inclusion in the PAP, and will include an analysis of the data, logs of soil boring, analytical results, findings, discussion and summary. The PAP will be revised, if needed, to include a discussion of the potential for, and mitigation of, water quality impacts and/or revegetation problems attendant to re-excavation and disposal of the coal refuse material.

SOIL BORING

The proposed soil borings (B-1 through B-5) have been carefully placed in an attempt to increase the possibility of encountering a suspected contaminated soil layer underlying the refuse and identifying the typical variations in thickness of this layer. The proposed borings are spaced throughout the slurry cell to attempt to characterize the subsurface with a minimum number of borings, while still maximizing data.

Proposed soil boring B-6 is located near the bottom of the coarse refuse lifts. This boring will be drilled to the top of the Mancos Shale, in the vicinity of an erosional valley, in an attempt to construct a groundwater monitor well. The purpose of the monitor well is to attempt to measure the quality of water that may be perched on top of the Mancos Shale, and flowing in the erosional valley.

The locations of the proposed borings (B-1 through B-6) are shown on Figure 2. Each soil boring will be drilled into the stratum immediately below the refuse material. The terminal depths of the borings are expected to be between 50 and 200 feet below grade. The drilling of the borings will be supervised and logged by a qualified geologist.

The soil borings will be drilled using a percussion hammer-reverse circulation rig. The percussion hammer rig uses a 9 7/8 inch diameter dual wall threaded casing that is driven along with the bit as drilling progresses. Each section of drill pipe is 10 feet long, and is connected to each other; this permits a continuous casing to line the bore hole which helps prevent caving and sloughing, which could result in possible cross-contamination within the bore hole. Because of the nature and size of the unconsolidated materials being drilled, and the depths of the borings, the percussion hammer rig was selected as the preferred drilling method for this project. A standard operating procedure (SOP) for percussion hammer drilling is included in Appendix A.

Upon completion of the drilling, the open bore holes not used for monitor well completion, will be abandoned using bentonite chips to fill the bore hole. The bentonite chips are hydrated to form a tight seal within the bore hole. This aids in the prevention of potential materials or drainage from migrating downward.

SAMPLING PLAN

West Slurry Cell and Coarse Refuse

Soil samples will be collected from each boring every ten feet as drilling progresses. The soil samples will be collected using a 5-gallon plastic pail as the cuttings are discharged from the drilling rig's cyclone. The soil sample will be divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place.

The ~~selected~~ samples from boreholes B-1 and B-2 will be sent directly to the laboratory (one composite sample per 20-feet in the refuse material, ~~one sample per five feet of the underlying soil material~~) and analyzed for the parameters listed in Appendix B. The other samples will be air dried and retained for future reference for a period of up to six months or until no longer needed. All samples taken will be examined by a qualified geologist to identify physical characteristics.

~~Samples from B-3 through B-6 will be compared with those encountered in B-1 and B-2. Samples which appear to have similar physical characteristics will be assumed to have similar chemical characteristics and will not need to be analyzed.~~

All of the samples taken from boreholes B-3 through B-6 will be retained. Efforts will be made to review the analyses from B-1 and B-2 as quickly as possible ~~and determine if any samples from B-3 through B-6 will need to be analyzed for a few specific parameters~~. After review of the physical characteristics, chemical analyses and the bore logs, consideration will be given to as to whether any analysis of specific samples from boreholes B-3 through B-6 is warranted. Additional samples from B-3 through B-6 will only be analyzed if materials are encountered which, ~~have substantially different physical characteristics and are suspected~~ because of their differing physical characteristics and/or suspected differences in chemical composition, are expected to require special reclamation considerations.

The soil samples to be analyzed will be sent under chain of custody to a Utah State or EPA Certified soils laboratory for analysis of the parameters identified in Appendix B, using the methodologies in accordance with the DOGM's guideline, Table 6.

Soil Layer Underlying The Refuse Material

Located on the southern slope of the east slurry cell is an orange-yellow layer that has cropped out in isolated spots. In an attempt to quantify the presence, areal extent, and composition of the suspected interfacial material, in-situ soil samples will be collected while drilling, if the suspected interfacial layer is encountered. Soil samples will be collected every 5-feet while drilling progresses through this layer. These samples will be analyzed as described below and in Appendix B.

The soil samples will be collected by advancing a 2-inch diameter, 24-inch long split-barrel sample tube, that contains brass liners, into the undisturbed soil beyond the bottom of the drill casing. After the drill casing reaches the proposed sampling depth, the sample tube is driven 24 inches using a 140 lb hammer that is dropped from a height of 30 inches. The collected soil sample will be divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place.

The ~~selected~~ samples of the underlying interfacial material from boreholes B-1, B-2, B-4 and B-6 will be sent directly to the laboratory (~~one sample per 20 feet in the refuse material,~~ one sample per five feet of the underlying interfacial soil material) and analyzed for the parameters listed in Appendix B. All samples not sent for analysis will be air dried and retained for future reference for a period of up to six months or until no longer needed. The soil samples will be sent under chain of custody to a Utah State or EPA Certified Soils Laboratory for chemical analysis.

At the analytical laboratory, the soil samples collected from the underlying soil layer will be prepared for analysis using the following techniques:

1) air drying the samples for 24-hours;
2) mechanically grinding the samples in order to pass through a 2-mm (10-mesh) stainless steel sieve;
3) saturate ~~mixing~~ the ground samples with deionized water with an electrical conductivity of $\leq$ 2 mmhos/cm, cover with an airtight lid, and allow to sit 24 hours to establish an equilibrium between the soil and water;
4) the liquid will then be collected for the requested analyses.

An extract, of the collected liquid, will be analyzed for the parameters outlined in Appendix B. The parameters to be analyzed and laboratory methodologies were agreed upon by DOGM at a meeting on February 2, 1994.

In addition to the analyses listed in Appendix B for the liquid extract portion, one sample for each five-foot increment from B-1, ~~and one from~~ B-2, B-4 and B-6 collected from the underlying layer will be analyzed for total arsenic, total cadmium, total chromium, and total selenium.

According to Mr. Don Verbica of the State of Utah-Division of Solid and Hazardous (DSHW), to estimate if a known (total) concentration of a metal might be near its respective TCLP-MCL, a factor of 20 times the TCLP-MCL for water may be used as an upper (total) MCL. If the total concentration for a collected soil sample exceeds 20 times the TCLP-MCL for water, for the metal in question, then a TCLP analysis will be performed on the sample which had a high metals concentration.

POSSIBLE MONITOR WELL CONSTRUCTION - Borehole B-6

Two alternatives are proposed for construction of a monitoring well in Borehole B-6; the design utilized will be based on the subsurface conditions at the time of drilling. If a perched water bearing zone of sufficient thickness is encountered on the surface of the Mancos Shale, a groundwater monitor well will be constructed as shown on Figure 3. If a perched water bearing zone of sufficient thickness is not encountered, the groundwater monitor well will be constructed as shown on Figure 4. The design shown on Figure 4 will permit water, that may be flowing on top of the Mancos Shale, to collect in the bottom of the casing, so a water sample can be collected for analysis. If insufficient water is encountered in B-6 to ensure the success of a monitoring well installation, no well will be constructed.

The monitor well is designed to be constructed with 2-inch diameter threaded, factory perforated and blank, schedule-40 PVC pipe. The screened interval is above the upper surface of the Mancos Shale. The precise length of the screened portion is dependent on the thickness of the water bearing zone encountered. The screened portion of the monitor well will consist of at least 2.5 feet of 0.010-inch slot, that is wrapped by a knitted polyester filter sock, designed to help prevent coal fines in the subsurface from entering the well screen. A threaded PVC cap is fastened to the bottom of the casing, solvents or cements are not used. The well casing is thoroughly washed and steam-cleaned prior to installation.

After setting the casing inside the bore hole, #30 silica sand is tremied or poured into the annular space from the bottom of the boring to 2 feet above the perforated interval. A 5 foot thick bentonite plug is placed above the filter material to prevent grout from infiltrating into the filter material. A type I/II portland cement mixture with 5% bentonite is tremied into the annular space from the top of the bentonite plug to the ground surface. A steel stove pipe is set over the wellhead and cemented into place.

Upon completion of the new monitor well, the top-of-casing (TOC) will be surveyed to mean-sea-level (MSL), relative to a known elevation benchmark. The monitor well will be developed by the drilling contractor using a submersible pump and/or airlift techniques until relatively clear, sand/silt free water is produced.

Monitor well sampling

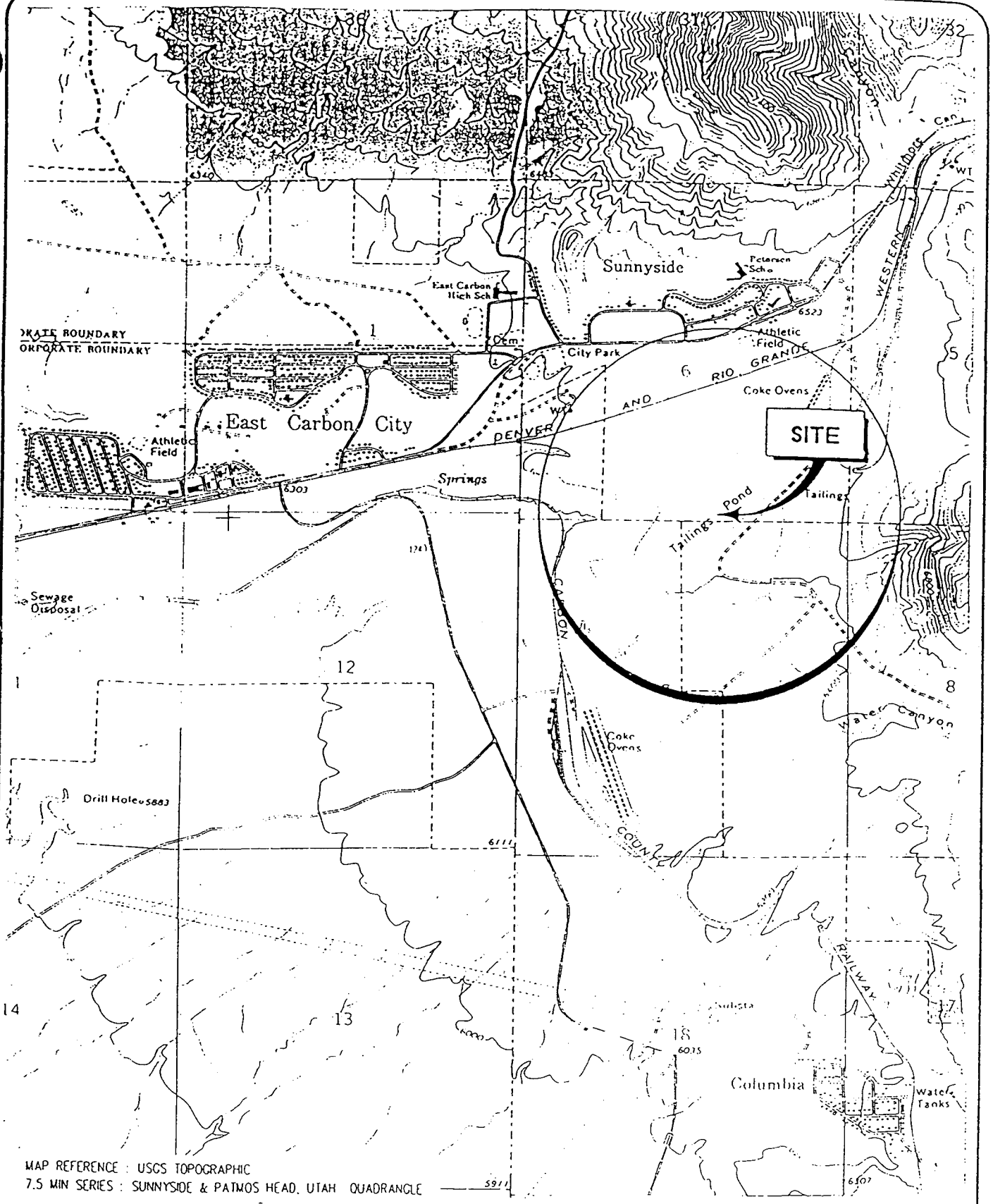
If adequate water is encountered, a representative water sample will be collected from the newly installed monitor well. A SOP for groundwater monitoring is presented in Appendix A. During purging and sampling of the monitor well, pH, temperature, specific conductivity, and dissolved oxygen will be measured and recorded. The collected water sample will be shipped under chain-of custody to a Utah State or EPA certified laboratory for analysis. The water sample will be analyzed for the parameters outlined in Appendix B using the appropriate EPA method.

If adequate water is encountered while drilling boreholes B-1 through B-5, a water sample will be collected and analyzed as listed in Appendix B. However, because of mining operations anticipated in the area, monitoring wells will not be constructed in any of the boreholes B-1 through B-5.

TECHNICAL REPORT

Following completion of the proposed work, a technical report will be prepared, for inclusion in the PAP, and will include an analysis of the data, logs of soil boring, analytical results, findings, discussion and summary. The PAP will be revised, if needed, to include a discussion of the potential for, and mitigation of, water quality impacts and/or revegetation problems attendant to re-excavation and disposal of the coal refuse material in the excess spoil area.

FIGURES

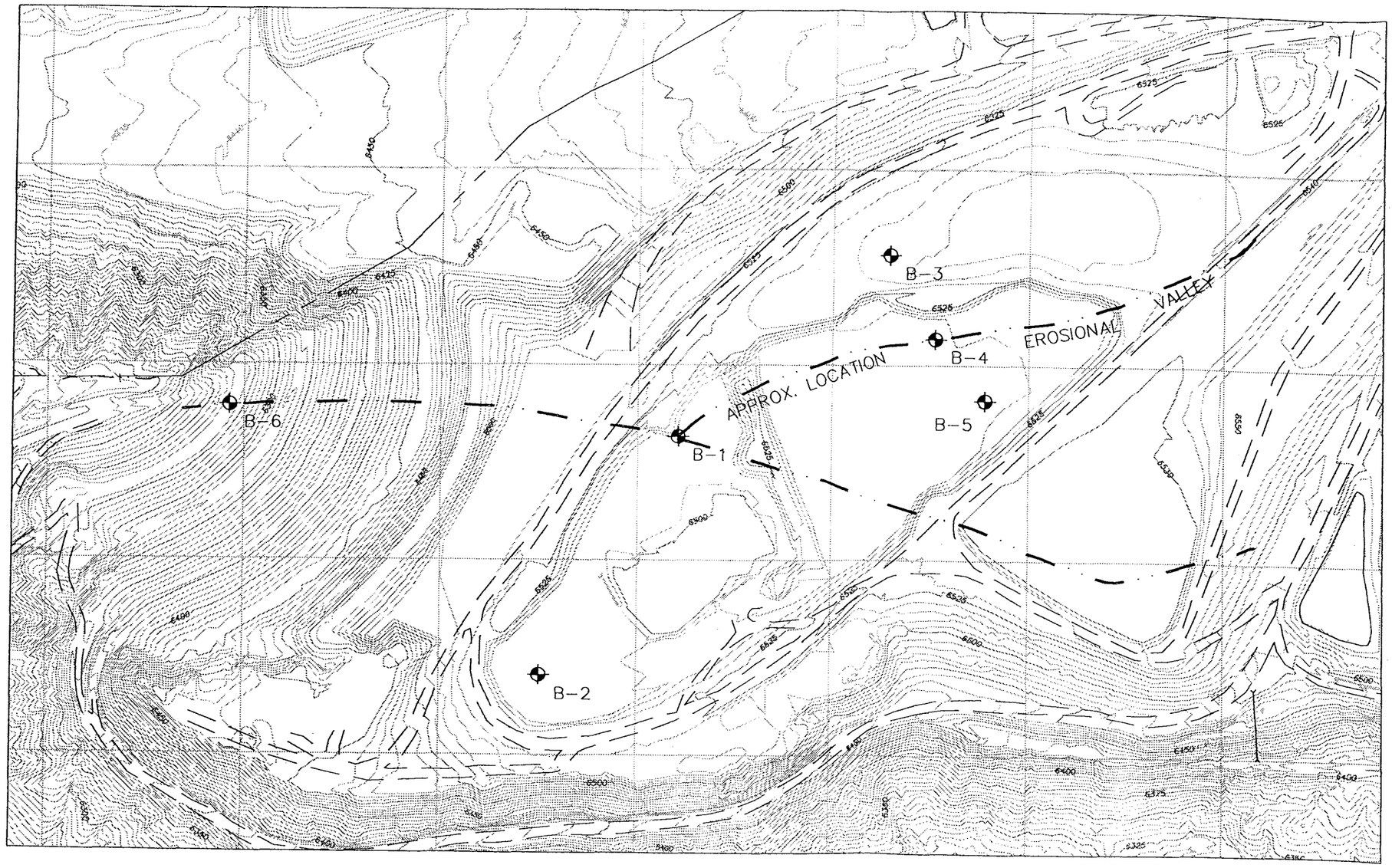


MAP REFERENCE : USGS TOPOGRAPHIC
7.5 MIN SERIES : SUNNYSIDE & PATMOS HEAD, UTAH QUADRANGLE

ECKHOFF WATSON AND PREATOR ENGINEERING
ENGINEERS PLANNERS SURVEYORS

FIGURE 1

SITE LOCATION MAP
SUNNYSIDE COGENERATION FACILITY
CARBON, COUNTY, UTAH



GRAPHIC SCALE

300 0 150 300 600

(IN FEET)
1 inch = 300 ft.

LEGEND

- PERMIT BOUNDARY
- EROSIONAL VALLEY
- ROAD
- B-1 PROPOSED BORING LOCATION

No.	Revision	By	Date
1	REV BORING LOCATIONS	AH	3/95

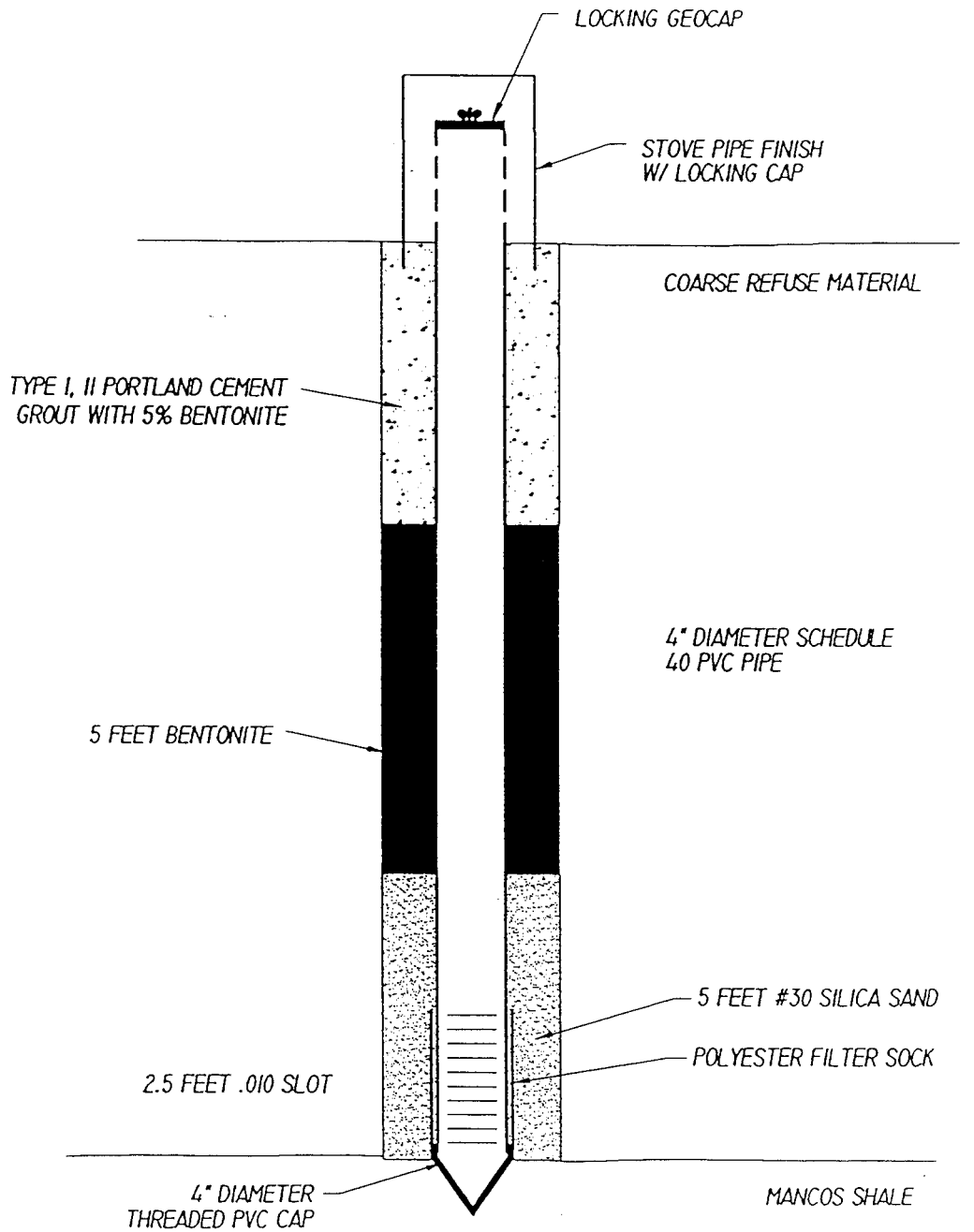
Date

Project Number EC450593
Designed By AEB
Drawn By AH
Checked By AEB Date 2/94

ECKHOFF WATSON AND PREATOR ENGINEERING
ENGINEERS PLANNERS SURVEYORS SALT LAKE CITY

SUNNYSIDE COGENERATION ASSOCIATES
SUNNYSIDE COGENERATION FACILITY, CARBON COUNTY, UTAH
PROPOSED BORING LOCATIONS

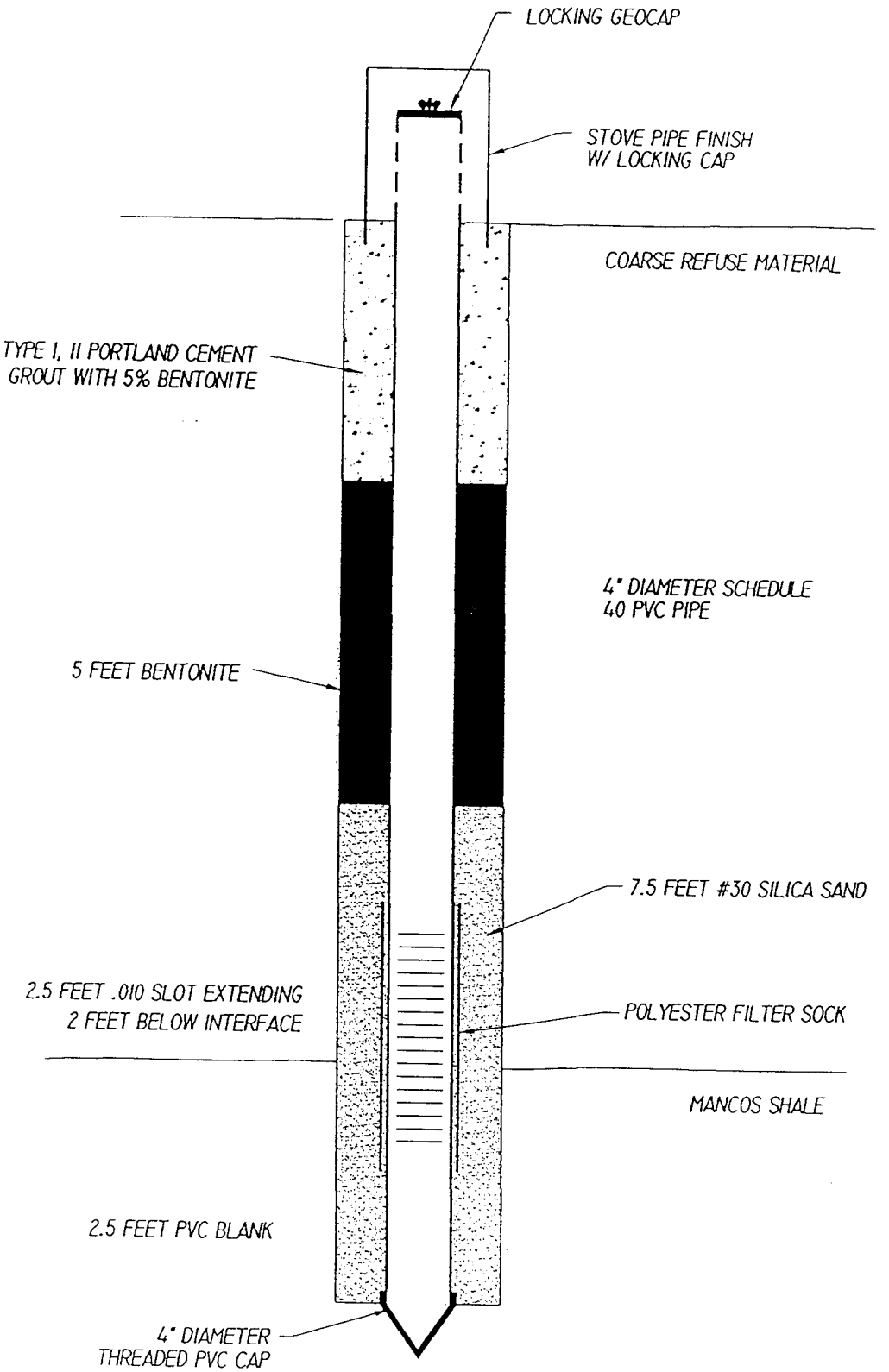
2



ECKHOFF WATSON AND PREATOR ENGINEERING
ENVIRONMENTAL SCIENCES DIVISION

FIGURE 3

SCHEMATIC #1 OF WELL CONSTRUCTION
SUNNYSIDE COGENERATION FACILITY
SUNNYSIDE, UTAH



ECKHOFF WATSON AND PREATOR ENGINEERING
ENVIRONMENTAL SCIENCES DIVISION

FIGURE 4

SCHEMATIC #2 OF WELL CONSTRUCTION
SUNNYSIDE COGENERATION FACILITY
SUNNYSIDE, UTAH

APPENDIX A
STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE

RE: PERCUSSION HAMMER - DUAL WALL REVERSE CIRCULATION DRILLING AND SOIL SAMPLING

The percussion hammer - reverse circulation rig uses a 9-7/8 inch diameter dual wall threaded casing that is driven along with the bit as drilling progresses. Each section of drill pipe is 10 feet long, and is connected to each other; this permits a continuous casing to line the bore hole which helps prevent caving and sloughing, which could result in possible cross-contamination within the bore hole. Drill cuttings are discharged through a cyclone that is mounted on the side of the drilling rig. Prior to drilling and soil sampling, all drilling and sampling equipment is steam-cleaned.

During drilling, a geologist, under supervision of a professional engineer or registered geologist, continuously logs each bore hole and collects soil samples. Each soil sample is examined and logged based on soil type, color, consistency or density of soil, moisture condition, any obvious staining, odor, and other field observations. Soil samples are collected by a State of Utah - Certified Soil and Groundwater Sampler.

In-situ soil samples are collected by advancing a split-spoon sampler that contains brass liners into the undisturbed soil beyond the tip of the casing. After the bit and casing reaches the proposed sampling depth, the sampling tube is driven 18 or 24 inches, depending on the length of the sampler, using a 140 lb hammer dropped from a height of 30 inches. The collected soil sample is divided into two parts and transferred from the brass liners to 1-gallon plastic zip-lock bag, sealed shut with the excess air expelled, properly labeled, and stored in a cool dry place. One part of the sample will be delivered or shipped under chain-of-custody to the analytical laboratory for chemical analysis, the other part of the sample will be retained for future reference.

Composite grab soil samples are collected using a clean 5-gallon plastic pail as the cuttings are discharged from the drilling rig's cyclone. The composite grab soil samples are divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place. One part of the sample will be delivered or shipped under chain-of-custody to the analytical laboratory for chemical analysis, the other part of the sample will be retained for future reference.

After collection of each soil sample, the sampling equipment is cleaned with a non-phosphatic detergent solution, and rinsed with clean water. Between each successive soil boring, all drilling and sampling equipment is steam-cleaned to help prevent cross-contamination.

STANDARD OPERATING PROCEDURE

RE: GROUNDWATER SAMPLING PROCEDURES

Upon arrival at a site, all sampling equipment is decontaminated by steam cleaning. Each well to be sampled is checked for the presence of free product using a clear bailer. SWL and TD measurements for the wells to be sampled are used to determine a calculated three-casing purge volume. Water is purged from 4-inch diameter wells using a submersible pump. 2-inch diameter wells are purged using a submersible pump or by hand bailing. Several rounds of water temperature, pH, and electric conductance measurements are often made in the course of purging. Equipment is removed from the well after the calculated purge volume is obtained or the well is pumped dry. Once sufficient recharge of the well has occurred, a sample is collected from the well using a stainless steel or disposable bailer. The water sample is retained in an appropriate container with preservative added, labeled appropriately, and stored on ice. The samples are then transported to a Utah State or EPA certified laboratory for analysis with complete chain-of-custody documentation. Sampling equipment is steam cleaned between wells and all contaminated purge water is contained in a 55-gallon drum(s).

APPENDIX B
LABORATORY ANALYSIS

Laboratory Analysis - West Slurry Cell and Coarse Refuse Material

PARAMETER	SUGGESTED METHODS
• pH	ASA Mono. No. 9, Part 2, (2 ed), 1982. Method 10-3.2, page 171. Perform pH on saturated paste.
• Electrical Conductivity	ASA Mono. Nop. 9, Part 2 (2 ed), 1982. Method 10-3.3, pages 172-173
• Saturation Percentage	SP=100 (total wt of water)/(wt of oven-dry soil).
• Particle Size Analysis (% sand, silt, clay)	Hydrometer method. Black et al. 1965. Methods of soil analysis. ASA Mono No. 9, Part 1, method 43-5, pgs 562-566
• Soluble Ca, Mg, and Na	ASA Mono. No. 9, Part 2, (2ed), 1982, Method 10-3.4. pages 173-174.
• Sodium Adsorption Ration	$[Na^+]/([Ca^{2+} + Mg^{2+}]/2)^{0.5}$
• Selenium	Extraction by ASA Mono. No.9, Part 2 (1 ed), 1965. Method 80-3.2, page 1122. Analyze by hydride generation for AA or ICP. ASA Mono. No. 9, Part 2 (2ed), 1982. Method 3-5.5, pages 59-61.
• Total N	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 31-3, pages 610-616.
• Nitrate-N	ASA Mono. No. 9, Part 2 (2 ed), 1982. Methods 33-4.1, pages 643-645; 33-8.3, pages 679-682 or Sims J.R., and G.D. Jackson. 1977. Soil Sci. Soc. Am. Proc. 35:603-607.
• Boron	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 25-9.1, page 443 for extraction and Method 25-5, pages 443-446 for analysis.
• Maximum Acid Potential*	US EPA. 1978. EPA 600/2-78-054. Method 3.2.6, page 60.

Laboratory Analysis - West Slurry Cell and Coarse Refuse (Continued)

PARAMETER	SUGGESTED METHODS
• Neutralization Potential	US EPA. 1978. EPA 600/2-28-054. Method 3.2.3, page 47.
• Organic Carbon	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 29-3.5.3, pages 571-573.
• Exchangeable Sodium**	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 13-4.4, pages 238-241. Using Flame Emission and using extractatea in method 8-3, page 152.
• Available Water Capacity	USDA SCS Soil Survey Investigation report No. 1, Method 4c1, Page 24.
• Rock Fragments	USDA SCS Soil Survey Investigation report No. 1, Method 3B, Page 18.

* Percent sulfate-sulfur, percent pyritic-sulfur, and % total-sulfur will be determined in reference to the acid potential analysis.

** If the samples have a SAR greater than 12 for clay textured soils or greater than 15 for sandy textured soils, then exchangeable sodium % should be analyzed.

Laboratory Analyses - Suspected Contaminated Layer Underlying The Refuse Material

PARAMETER

1) VIA ATOMIC ABSORPTION

Selenium	Arsenic	Chromium	Nickel
Copper	Cadmium	Zinc	Lead
Molybdenum			

2) VIA ICP SPECTROMETRY

Aluminum	Iron	Cobalt	Manganese
Boron			

3) Alkalinity (CO_3^{2-}, HCO_3^{2-})
4) Exchangeable acidity
5) Chloride
6) Nitrate
7) Sulfate

Monitor Well - Water Sample Analysis

HCO_3^{2-}	CO_3^{2-}	Acidity	Hardness
Oil and Grease	BOD-5 day	TSS	TDS
Ammonia Nitrogen	Nitrite Nitrogen	Total Phenolics	Sulfate
Total Cyanide			

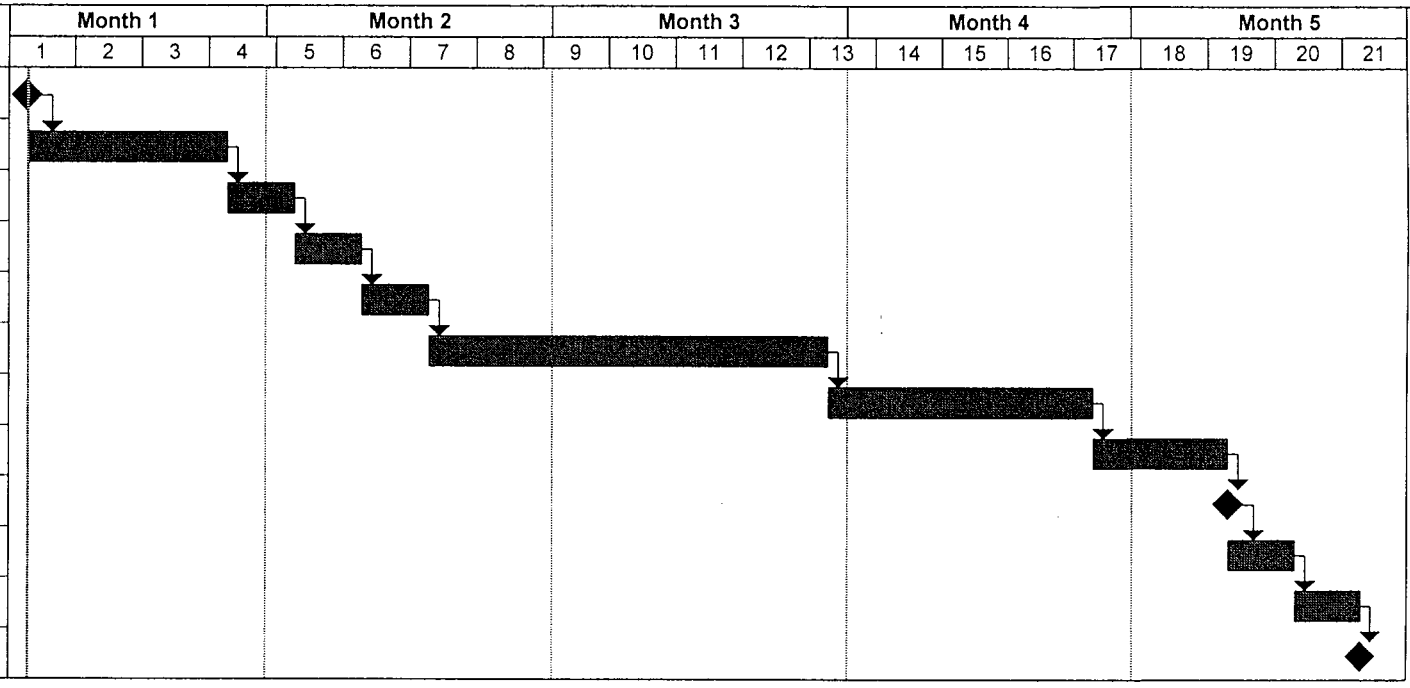
Total and Dissolved Metals

Arsenic	Cadmium	Copper	Lead
Mercury	Selenium	Molybdenum	Potassium
Sodium	Nickel	Aluminum	Boron
Iron	Calcium	Magnesium	Manganese

APPENDIX C
PROPOSED SCHEDULE

SUNNYSIDE COGENERATION ASSOCIATES
SCHEDULE
DRILLING, SAMPLING AND ANALYSIS OF ACID/TOXIC FORMING DATA

ID	Task Name
1	DOGM Review and Acceptance of Plan
2	Obtain Bids from Drillers & Labs
3	Select Drilling Contractor & Lab
4	Mobilization
5	Drilling
6	Testing
7	Analysis
8	Reporting
9	Draft Report to SCA for Review
10	SCA Review
11	Final Report
12	Submit to DOGM



SUNNYSIDE COGENERATION FACILITY
Sunnyside Operations Associates, L.P.
Post Office Box 10
East Carbon, Utah 84520
(801) 888-4476
(801) 888-2538 fax

April 10, 1995

Ms. Pamela Grubaugh-Littig
Division of Oil, Gas and Mining
3 Triad Center - Suite 350
Salt Lake City, Utah 84180-1203

#2

RE: Permit No. ACT/007/035: Sunnyside Cogeneration Associates
Permit Submittal: NOV N93-13-2-1, Permit Condition #18
Engineer's Project No. EC450593

Copy Darron

Dear Pam,

This submittal includes a revision to PAP Appendix 6-5 which details the plan for characterization of the Refuse Pile/West Slurry Cell to meet requirements of NOV N93-13-2-1, and Permit Condition #18. The revisions reflect the concepts as discussed and agreed in a meeting with Henry Sauer at DOGM on March 28, 1995. Please review these revisions as quickly as possible so that SCA can proceed with the work planned.

If you have any questions concerning this submittal, please feel free to call the SCA Plant Manager, at (801) 888-4476.

Sincerely,

Thomas G. Eckstein
Acting Plant Manager

TGE/lls

Attachments

c.c. Bob Evans, NRG
Jim O'Donnell, NRG
Doug Burnham, B&W
Alane E. Boyd, EWP
Brian Burnett, CNM
Bill Malencik, DOGM
Henry Sauer, DOGM
Joe Helfrich, DOGM (letter)

APPLICATION FOR PERMIT CHANGE

Title of Change: SUNNYSIDE COGENERATION ASSOCIATES
Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18
Plan for Characterization of the Refuse Pile/West Slurry Cell

Permit Number: ACT/007/035

Mine: Sunnyside Cogen. Assoc.

Permittee: Sunnyside Cogen. Assoc.

Description - include reason for change and timing required to implement: Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18; Plan for Characterization of the Refuse Pile/West Slurry Cell

☐ Yes	☒ No	1. Change in the size of the Permit Area? _____ acres ☐ increase ☐ decrease.
☐ Yes	☒ No	2. Change in the size of the Disturbed Area? _____ acres ☐ increase ☐ decrease.
☐ Yes	☒ No	3. Will permit change include operations outside the Cumulative Hydrologic Impact Area?
☐ Yes	☒ No	4. Will permit change include operations in hydrologic basins other than currently approved?
☐ Yes	☒ No	5. Does permit change result from cancellation, reduction or increase of insurance or reclamation bond?
☐ Yes	☒ No	6. Does permit change require or include public notice publication?
☒ Yes	☐ No	7. Permit change as a result of a Violation? Violation # N93-13-2-1 , PERMIT CONDITION 18
☐ Yes	☒ No	8. Permit change as a result of a Division Order? D.O. #
☐ Yes	☒ No	9. Permit change as a result of other laws or regulations? Explain:
☐ Yes	☒ No	10. Does permit change require or include ownership, control, right-of-entry, or compliance information?
☐ Yes	☒ No	11. Does the permit change affect the surface landowner or change the post mining land use?
☒ Yes	☐ No	12. Does permit change require or include collection and reporting of any baseline information?
☐ Yes	☒ No	13. Could the permit change have any effect on wildlife or vegetation outside the current disturbed area?
☐ Yes	☒ No	14. Does permit change require or include soil removal, storage or placement?
☐ Yes	☒ No	15. Does permit change require or include vegetation monitoring, removal or revegetation activities?
☐ Yes	☒ No	16. Does permit change require or include construction, modification, or removal of surface facilities?
☐ Yes	☒ No	17. Does permit change require or include water monitoring, sediment or drainage control measures?
☐ Yes	☒ No	18. Does permit change require or include certified designs, maps, or calculations?
☐ Yes	☒ No	19. Does permit change require or include underground design or mine sequence and timing?
☐ Yes	☒ No	20. Does permit change require or include subsidence control or monitoring?
☐ Yes	☒ No	21. Have reclamation costs for bonding been provided or revised for any change in the reclamation plan?
☐ Yes	☒ No	22. Is permit change within 100 feet of a public road or perennial stream or 500 feet of an occupied dwelling?
☐ Yes	☒ No	23. Is this permit change coal exploration activity ☐ inside ☐ outside of the permit area? N/A

☒ **Attached 3 complete copies of proposed permit change as it would be incorporated into the Mining and Reclamation Plan.**

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all aspects with the laws of Utah in reference to commitments, undertakings, and obligations herein.

E. Boyd, P.E. 4/10/95
Signed - Name - Position - Date

Subscribed and sworn to before me this 10th day of April, 19 95

NOTARY PUBLIC
MARILYN YOUNG
1121 E. 4861 S. #C-460
Salt Lake City, Utah 84117
My Commission Expires
3/8/97
STATE OF UTAH

Notary Public

My Commission Expires: 3/8/97

Attest: STATE OF Utah)
COUNTY OF Salt Lake) ss:

RECEIVED
APR 12 1995
DIV OF OIL, GAS & MINING

Received by Oil, Gas & Mining

ASSIGNED PERMIT CHANGE NUMBER

Application for Permit Change
Detailed Schedule of Changes to the Permit

Title of Change: SUNNYSIDE COGENERATION ASSOCIATES Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18 Plan for Characterization of the Refuse Pile/West Slurry Cell	Permit Number: ACT/007/035 Mine: Sunnyside Cogen. Assoc. Permittee: Sunnyside Cogen. Assoc.

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit change. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages or other information as needed to specifically locate, identify and revise the exiting mining and reclamation plan. **Include page, section and drawing numbers as part of the description.**

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	☒ REPLACE	☐ REMOVE	PAP APPENDIX 6-5 Drilling and Sample Collection
☐ ADD	☐ REPLACE	☐ REMOVE	
☐ ADD	☐ REPLACE	☐ REMOVE	
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Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

95C

APPENDIX 6-5

DRILLING AND SAMPLE COLLECTION

WEST SLURRY CELL AND COARSE REFUSE PILE
SUNNYSIDE COGENERATION ASSOCIATES
CARBON COUNTY, UTAH

APPENDIX 6-5

DRILLING AND SAMPLE COLLECTION

WEST SLURRY CELL AND COARSE REFUSE PILE
SUNNYSIDE COGENERATION ASSOCIATES
CARBON COUNTY, UTAH

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PROPOSED PLAN

Sunnyside Cogeneration Associates (SCA) submits this proposal to satisfy Permit Condition #18, R645-301 Rules, and Division Requirements to Characterize the Refuse Pile. The proposed plan includes drilling six soil borings, collecting soil samples, submitting selected samples for laboratory analysis, and preparating a technical report. The purpose of the plan is to assess whether materials in and immediately under the west slurry cell and coarse refuse pile (slurry and coarse refuse), at the Sunnyside Cogeneration Facility, Carbon County, Utah (Figure 1), are considered potentially toxic- and/or acid-forming. Information gathered from this proposed plan will assist in determining the appropriate methods for reclamation as required by R645-301 and R645-302.

In order to assess whether materials in and beneath the west slurry cell and coarse refuse area are considered potentially toxic- and/or acid-forming, SCA proposes the following:

(1) Drill five soil borings (B-1 through B-5) in the west slurry cell, collect soil samples, and record detailed logs.
(2) Drill one soil boring (B-6) near the bottom of the coarse refuse lifts, and if an adequate quantity of water is encountered, convert it to a small diameter monitor well to monitor water quality on top of the Mancos Shale in that area.
(3) Submit samples from Boreholes B-1 and B-2 for complete analysis as identified under "Sampling Plan" below.
(4) Retain samples from Boreholes B-3, B-4, B-5, and / or B-6.
(5) Compare boring logs and analytical results with information available from the John T. Boyd Drilling of 1991 and 1992.
(6) Identify potentially acid- or toxic-forming strata down to and including the stratum immediately below the refuse material.
(7) Quantify the material identified in #6 above that may require special reclamation considerations.
(8) Prepare a technical report outlining the findings of this plan.

The schedule under which this study will be conducted is presented in Appendix C.

BACKGROUND

Three major drilling investigations were performed on the refuse pile to examine the quantity and quality of the refuse material for use at SCA's electric generating station. Applied Hydrology Associates, Inc. performed their investigation in 1987. John T. Boyd Company (JTBC) performed two investigations, one in 1991 and 1992. In September 1992, JTBC was retained to perform an evaluation of the quantity and quality of fuel material in the Sunnyside Coal refuse pile in the vicinity of the west slurry cell. Numerous exploratory borings were drilled to collect samples for BTU analysis. Duplicate samples were collected, but subsequently misplaced at the analytical laboratory.

The State of Utah-DOGM requires a minimum 4 feet thick cap be placed over acid- or toxic-forming substances in the west slurry cell in order to properly reclaim the cell. However, a cap of less than four feet can be utilized if the underlying materials are shown to be non-toxic and non acid-forming. Sunnyside Cogeneration Association will propose using less than four feet of capping material for reclamation if the results from this study show that the materials exposed at the time of reclamation will not be toxic- or acid-forming.

The criteria used to determine if less than four feet can be used are outlined in the State of Utah - DOGM's, Guideline for Management of Topsoil and Overburden for Underground and Surface Coal Mining, ("Guideline"). According to the "guideline," representative samples should be collected and analyzed for specific parameters to determine if the underlying materials are considered toxic and/or acid-forming. However, because the duplicate samples collected during the fuel evaluation were misplaced at the analytical laboratory, it is necessary to recollect samples of the west slurry cell.

SATISFACTION OF THE R645-301 REGULATIONS

Rule Citation: 645-301-553.252. Following final grading of the refuse pile, the coal mine waste will be covered with a minimum of four feet of the best available, non-toxic and non-combustible material, in a manner that does not impede drainage from the underdrains. The Division may allow less than four feet of cover material based on physical and chemical analyses which show that the requirements of R645-301-244.200 and R645-301-353 through R645-301-357.

Discussion: The six boreholes will provide a look at the material within and under the refuse pile. Physical analyses of all boreholes and chemical analysis of selected boreholes will be performed to show that the requirements of R645-301-244.200 and R645-301-353 through R645-301-357 can be met.

Rule Citation: R645-301-553.300. Exposed coal seams, acid- and toxic-forming materials, and combustible materials exposed, used or produced during mining will be adequately covered with non-toxic and non-combustible materials, or treated, to control the impact on surface and ground water in accordance with R645-301-731.100 through R645-301-731.522 and R645-301-731.800, to prevent sustained combustion, and to minimize adverse effects on plant growth and the approved post-mining land use.

Discussion: The chemical analyses to be performed on the selected samples will determine which of the materials, if any, are acid and toxic-forming. The information obtained will assist in determining adequate management of these materials to control the impact on surface and ground water, prevent sustained combustion, and to minimize adverse effects on plant growth and the approved post-mining land use.

Rule Citation: R645-301-623. Each application will include geologic information in sufficient detail to assist in: 623.100. Determining all potentially acid- or toxic-forming strata down to and including the stratum immediately below the coal seam to be mined; 623.200. Determining whether reclamation as required by R645-301 and R645-302 can be accomplished.

Discussion: The boreholes will be drilled sufficiently into the stratum immediately below the refuse pile to collect samples of the material for analysis. The selected samples will be analyzed for acid- or toxic-forming potential. Information gathered will assist in an assessment of the reclamability of the material.

Rule Citation: R645-301-624.200. . . . For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, samples will be collected and analyzed from test borings; drill cores; or fresh, unweathered, uncontaminated samples from rock outcrops down to and including the deeper of either the stratum immediately below the lowest coal seam to be mined or any aquifer below the lowest coal seam to be mined which may be adversely impacted by mining.

Discussion: Samples from the drilling program will be collected and analyzed from test borings as required in 624.200. Efforts will be made to expedite the process between sampling and analysis. The analysis is expected to assist in identifying the strata that may contain acid- or toxic-forming materials and will include analysis of sulfur. If adequate water is encountered in B-6, a water quality sample will be analyzed. Computer models will be used to assist in quantifying the material underlying the refuse that may require special reclamation considerations.

Permit Condition #18: The permittee must . . . conduct additional analyses, for the purposes of determining the acid and/or toxic and alkalinity forming potential of the existing slurry ponds and coarse refuse pile material. The commitment must include the analysis of all the constituents outlined in the Division's Guidelines for the Management of Topsoil and Overburden, Table 6. The permittee must also specify the sample site locations to be selected . . .

In addition . . . the permittee must submit plans and laboratory results, for inclusion in the PAP, from the above sampling of the refuse and slurry material. Plans must include a discussion of the potential for, and mitigation of, water quality impacts and or revegetation problems attendant to reexcavation and disposal of the coal refuse material.

Discussion: This proposed plan identifies the locations of boreholes to be drilled and selected samples to be analyzed for the purposes of determining the acid and/or toxic and alkalinity forming potential of the refuse material. The analysis identified herein includes all the constituents outlined in the Division's Guidelines for the Management of Topsoil and Overburden, Table 6. This analysis will satisfy Permit Condition #18. Following completion of the proposed work, a technical report will be prepared, for inclusion in the PAP, and will include an analysis of the data, logs of soil borings, analytical results, findings, discussion and summary. The PAP will be revised, if needed, to include a discussion of the potential for, and mitigation of, water quality impacts and/or revegetation problems attendant to reexcavation and disposal of the coal refuse material.

SOIL BORINGS

The proposed soil borings (B-1 through B-5) have been carefully placed in an attempt to increase the possibility of encountering a suspected contaminated soil layer underlying the refuse and identifying the typical variations in thickness of this layer. The proposed borings are spaced throughout the slurry cell to attempt to characterize the subsurface with a minimum number of borings, while still maximizing data.

Proposed soil boring B-6 is located near the bottom of the coarse refuse lifts. This boring will be drilled to the top of the Mancos Shale, in the vicinity of an erosional valley, in an attempt to construct a groundwater monitor well. The purpose of the monitor well is to attempt to measure the quality of water that may be perched on top of the Mancos Shale, and flowing in the erosional valley.

The locations of the proposed borings (B-1 through B-6) are shown on Figure 2. Each soil boring will be drilled into the stratum immediately below the refuse material. The terminal depths of the borings are expected to be between 50 and 200 feet below grade. The drilling of the borings will be supervised and logged by a qualified geologist.

The soil borings will be drilled using a percussion hammer-reverse circulation rig. The percussion hammer rig uses a 9 7/8 inch diameter dual wall threaded casing that is driven along with the bit as drilling progresses. Each section of drill pipe is 10 feet long, and is connected to each other; this permits a continuous casing to line the bore hole which helps prevent caving and sloughing, which could result in possible cross-contamination within the bore hole. Because of the nature and size of the unconsolidated materials being drilled, and the depths of the borings, the percussion hammer rig was selected as the preferred drilling method for this project. A standard operating procedure (SOP) for percussion hammer drilling is included in Appendix A.

Upon completion of the drilling, the open bore holes not used for monitor well completion, will be abandoned using bentonite chips to fill the bore hole. The bentonite chips are hydrated to form a tight seal within the bore hole. This aids in the prevention of potential materials or drainage from migrating downward.

SAMPLING PLAN

West Slurry Cell and Coarse Refuse

Soil samples will be collected from each boring every ten feet as drilling progresses. The soil samples will be collected using a 5-gallon plastic pail as the cuttings are discharged from the drilling rig's cyclone. The soil sample will be divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place.

Selected samples from boreholes B-1 and B-2 will be sent directly to the laboratory (one sample per 20-feet in the refuse material, one sample per five feet of the underlying soil material). The other samples will be retained for future reference for a period of up to six months or until no longer needed. All samples taken will be examined by a qualified geologist to identify physical characteristics.

Samples from B-3 through B-6 will be compared with those encountered in B-1 and B-2. Samples which appear to have similar physical characteristics will be assumed to have similar chemical characteristics and will not need to be analyzed.

All of the samples taken from boreholes B-3 through B-6 will be retained. Efforts will be made to review the analyses from B-1 and B-2 as quickly as possible and determine if any samples from B-3 through B-6 will need to be analyzed for a few specific parameters. Additional samples from B-3 through B-6 will only be analyzed if materials are encountered which have substantially different physical characteristics and are suspected to require special reclamation considerations.

The soil samples to be analyzed will be sent under chain of custody to a Utah State or EPA Certified soils laboratory for analysis of the parameters identified in Appendix B, using the methodologies in accordance with the DOGM's guideline, Table 6.

Soil Layer Underlying The Refuse Material

Located on the southern slope of the east slurry cell is an orange-yellow layer that has cropped out in isolated spots. In an attempt to quantify the presence, areal extent, and composition of the suspected material, in-situ soil samples will be collected while drilling, if the suspected layer is encountered. Soil samples will be collected every 5-feet while drilling progresses through this layer.

The soil samples will be collected by advancing a 2-inch diameter, 24-inch long split-barrel sample tube, that contains brass liners, into the undisturbed soil beyond the bottom of the drill casing. After the drill casing reaches the proposed sampling depth, the sample tube is driven 24 inches using a 140 lb hammer that is dropped from a height of 30 inches. The collected soil sample will be divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place.

Selected samples from boreholes B-1 and B-2 will be sent directly to the laboratory (one sample per 20-feet in the refuse material, one sample per five feet of the underlying soil material). All samples not sent for analysis will be retained for future reference for a period of up to six months or until no longer needed. The soil samples will be sent under chain of custody to a Utah State or EPA Certified Soils Laboratory for chemical analysis.

At the analytical laboratory, the soil samples collected from the underlying soil layer will be prepared for analysis using the following techniques:

1) air drying the samples for 24-hours;
2) mechanically grinding the samples in order to pass through a 2-mm (10-mesh) stainless steel sieve;
3) mixing the ground samples with deionized water with an electrical conductivity of $\leq$ 2 mmhos/cm and covering with an airtight lid and allowed to sit 24 hours to establish an equilibrium between the soil and water;
4) the liquid will then be collected for the requested analyses.

An extract, of the collected liquid, will be analyzed for the parameters outlined in Appendix B. The parameters to be analyzed and laboratory methodologies were agreed upon by DOGM at the February 2, 1994 meeting.

In addition to the analyses listed in Appendix B for the liquid extract portion, one sample from B-1 and one from B-2 collected from the underlying layer will be analyzed for total arsenic, total cadmium, total chromium, and total selenium.

According to Mr. Don Verbica of the State of Utah-Division of Solid and Hazardous (DSHW), to estimate if a known (total) concentration of a metal might be near its respective TCLP-MCL, a factor of 20 times the TCLP-MCL for water may be used as an upper (total) MCL. If the total concentration for a collected soil sample exceeds 20 times the TCLP-MCL for water, for the metal in question, then a TCLP analysis will be performed on the sample which had a high metals concentration.

POSSIBLE MONITOR WELL CONSTRUCTION - Borehole B-6

Two alternatives for monitoring wells are proposed; the design utilized will be based on the subsurface conditions at the time of drilling. If a perched water bearing zone, of sufficient thickness is encountered on the surface of the Mancos Shale, a groundwater monitor well will be constructed as shown on Figure 3. If a perched water bearing zone of sufficient thickness is not encountered, the groundwater monitor well will be constructed as shown on Figure 4. The design shown on Figure 4 will permit water, that may be flowing on top of the Mancos Shale, to collect in the bottom of the casing, so a water sample can be collected for analysis. If insufficient water is encountered in B-6 to ensure the success of a monitoring well installation, no well will be constructed.

The monitor well is designed to be constructed with 2-inch diameter threaded, factory perforated and blank, schedule-40 PVC pipe. The screened interval is above the upper surface of the Mancos Shale. The precise length of the screened portion is dependent on the thickness of the water bearing zone encountered. The screened portion of the monitor well will consist of at least 2.5 feet of 0.010-inch slot, that is wrapped by a knitted polyester filter sock, designed to help prevent coal fines in the subsurface from entering the well screen. A threaded PVC cap is fastened to the bottom of the casing, solvents or cements are not used. The well casing is thoroughly washed and steam-cleaned prior to installation.

After setting the casing inside the bore hole, #30 silica sand is tremied or poured into the annular space from the bottom of the boring to 2 feet above the perforated interval. A 5 foot thick bentonite plug is placed above the filter material to prevent grout from infiltrating into the filter material. A type I/II portland cement mixture with 5% bentonite is tremied into the annular space from the top of the bentonite plug to the ground surface. A steel stove pipe is set over the wellhead and cemented into place.

Upon completion of the new monitor well, the top-of-casing (TOC) will be surveyed to mean-sea-level (MSL), relative to a known elevation benchmark. The monitor well will be developed by the drilling contractor using a submersible pump and/or airlift techniques until relatively clear, sand/silt free water is produced.

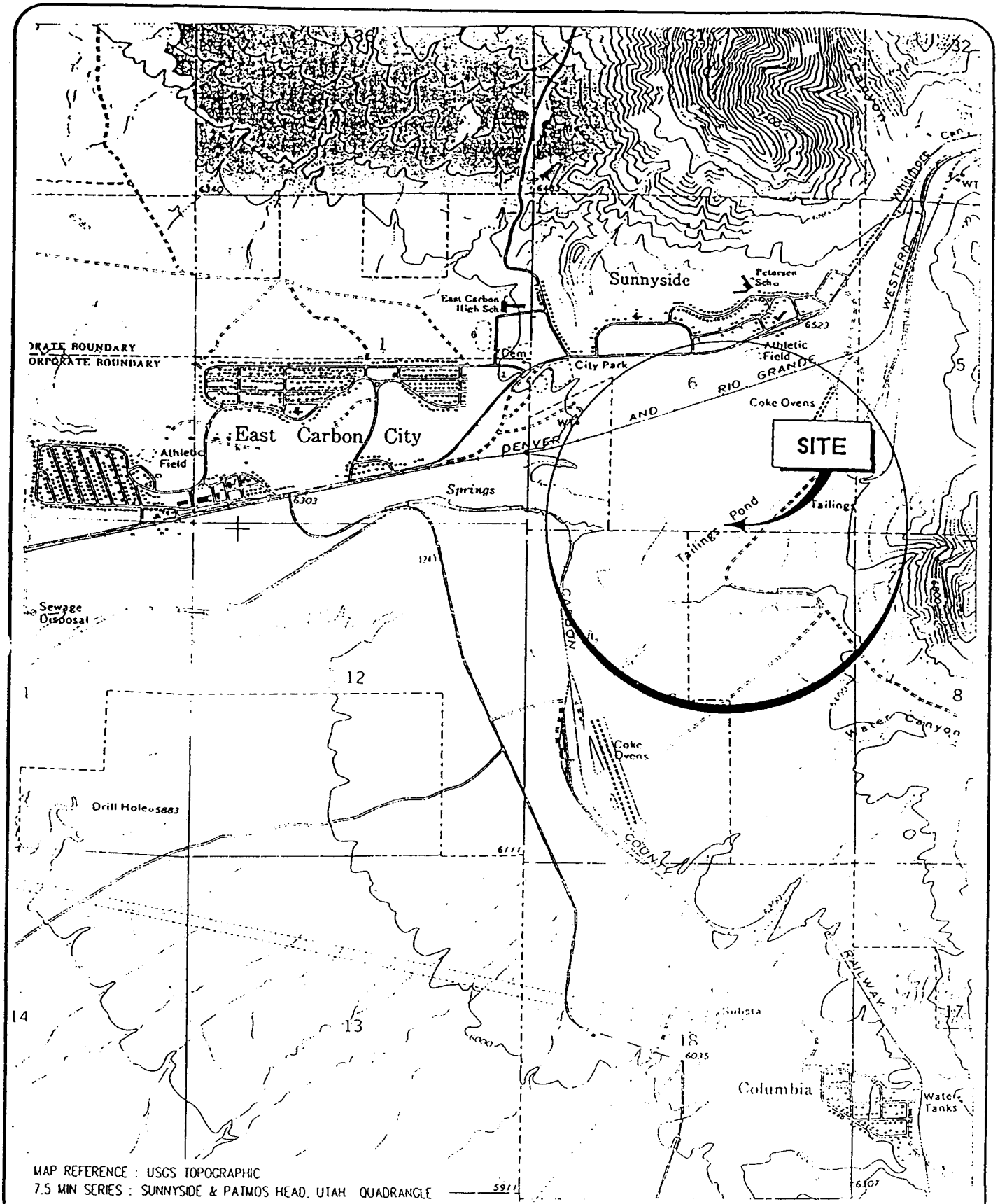
Monitor well sampling

If adequate water is encountered, a representative water sample will be collected from the newly installed monitor well. A SOP for groundwater monitoring is presented in Appendix A. During purging and sampling of the monitor well, pH, temperature, specific conductivity, and dissolved oxygen will be measured and recorded. The collected water sample will be shipped under chain-of custody to a Utah State or EPA certified laboratory for analysis. The water sample will be analyzed for the parameters outlined in Appendix B using the appropriate EPA method.

TECHNICAL REPORT

Following completion of the proposed work, a technical report will be prepared, for inclusion in the PAP, and will include an analysis of the data, logs of soil borings, analytical results, findings, discussion and summary. The PAP will be revised, if needed, to include a discussion of the potential for, and mitigation of, water quality impacts and/or revegetation problems attendant to reexcavation and disposal of the coal refuse material in the excess spoil area.

FIGURES

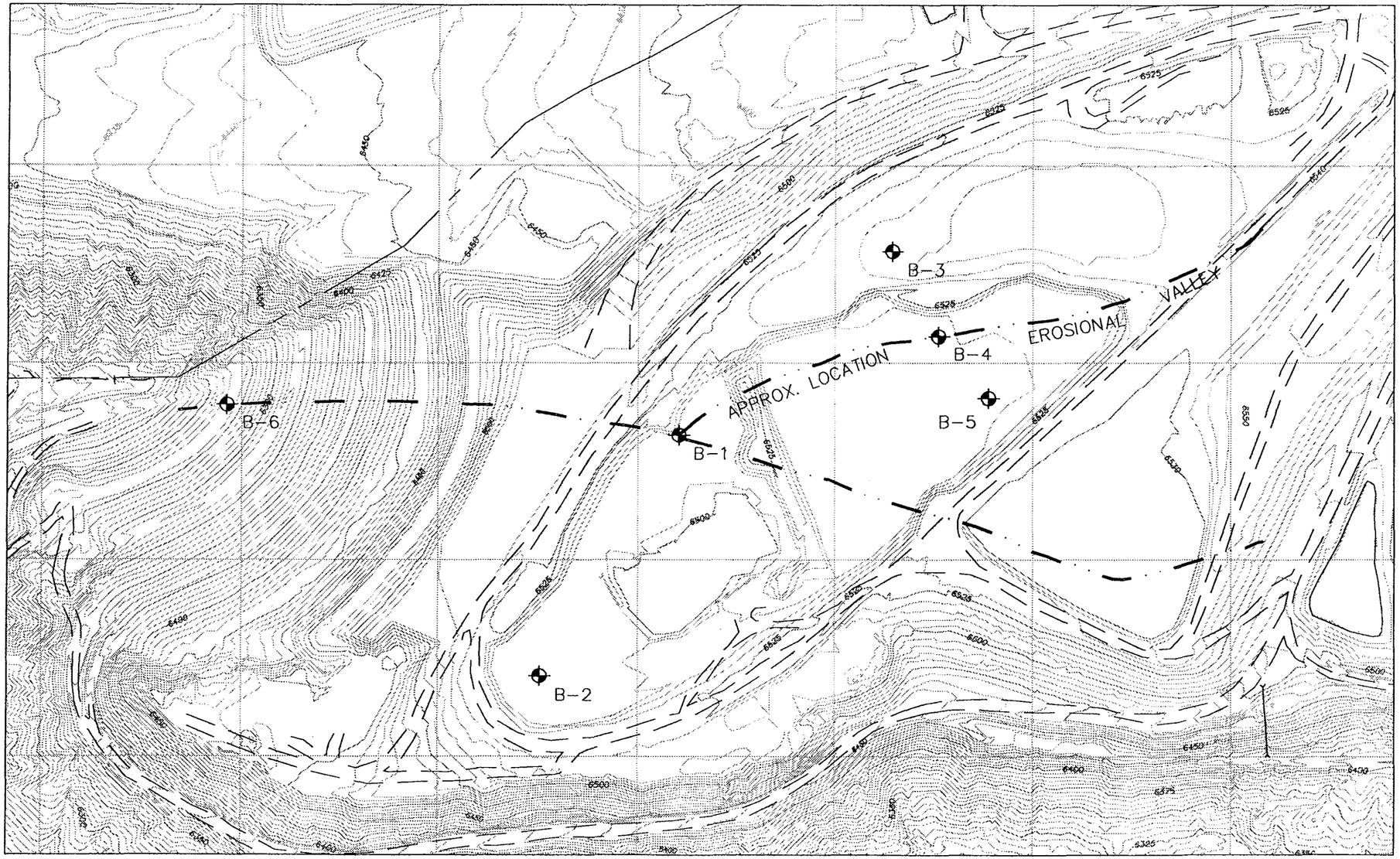


ECKHOFF WATSON AND PREATOR ENGINEERING

ENGINEERS PLANNERS SURVEYORS

FIGURE 1

SITE LOCATION MAP
SUNNYSIDE COGENERATION FACILITY
CARBON, COUNTY, UTAH



GRAPHIC SCALE

300 0 150 300 600

(IN FEET)

1 inch = 300ft.

LEGEND

- PERMIT BOUNDARY
- EROSIONAL VALLEY
- ROAD
- B-1 PROPOSED BORING LOCATION

No.	Revision	By	Date
1	REV BORING LOCATIONS	AH	3/95

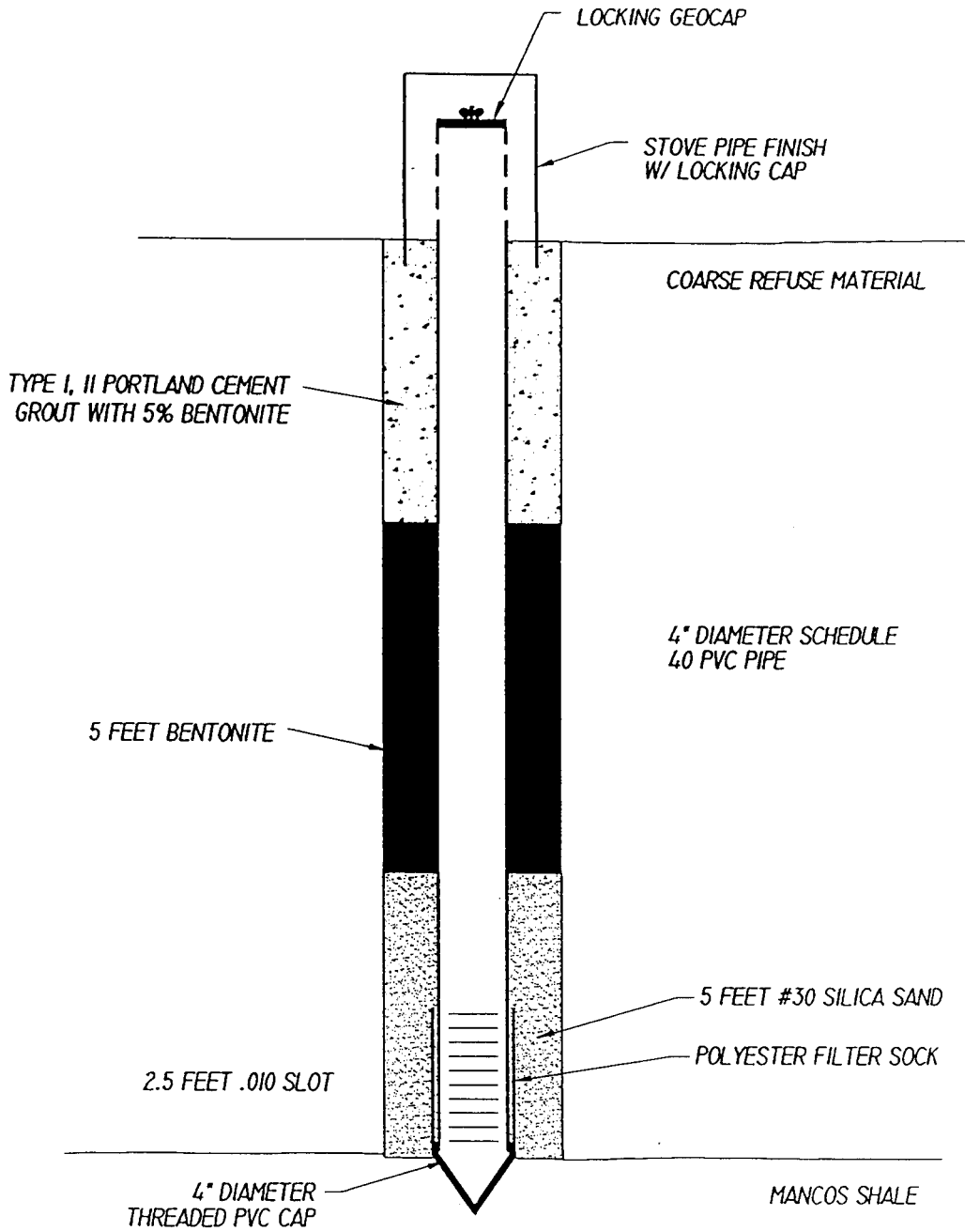
Date

Project Number EC450593
Designed By AEB
Drawn By AH
Checked By AEB Date 2/94

ECKHOFF WATSON AND PREATOR ENGINEERING
ENGINEERS PLANNERS SURVEYORS SALT LAKE CITY

SUNNYSIDE COGENERATION ASSOCIATES
SUNNYSIDE COGENERATION FACILITY, CARBON COUNTY, UTAH
PROPOSED BORING LOCATIONS

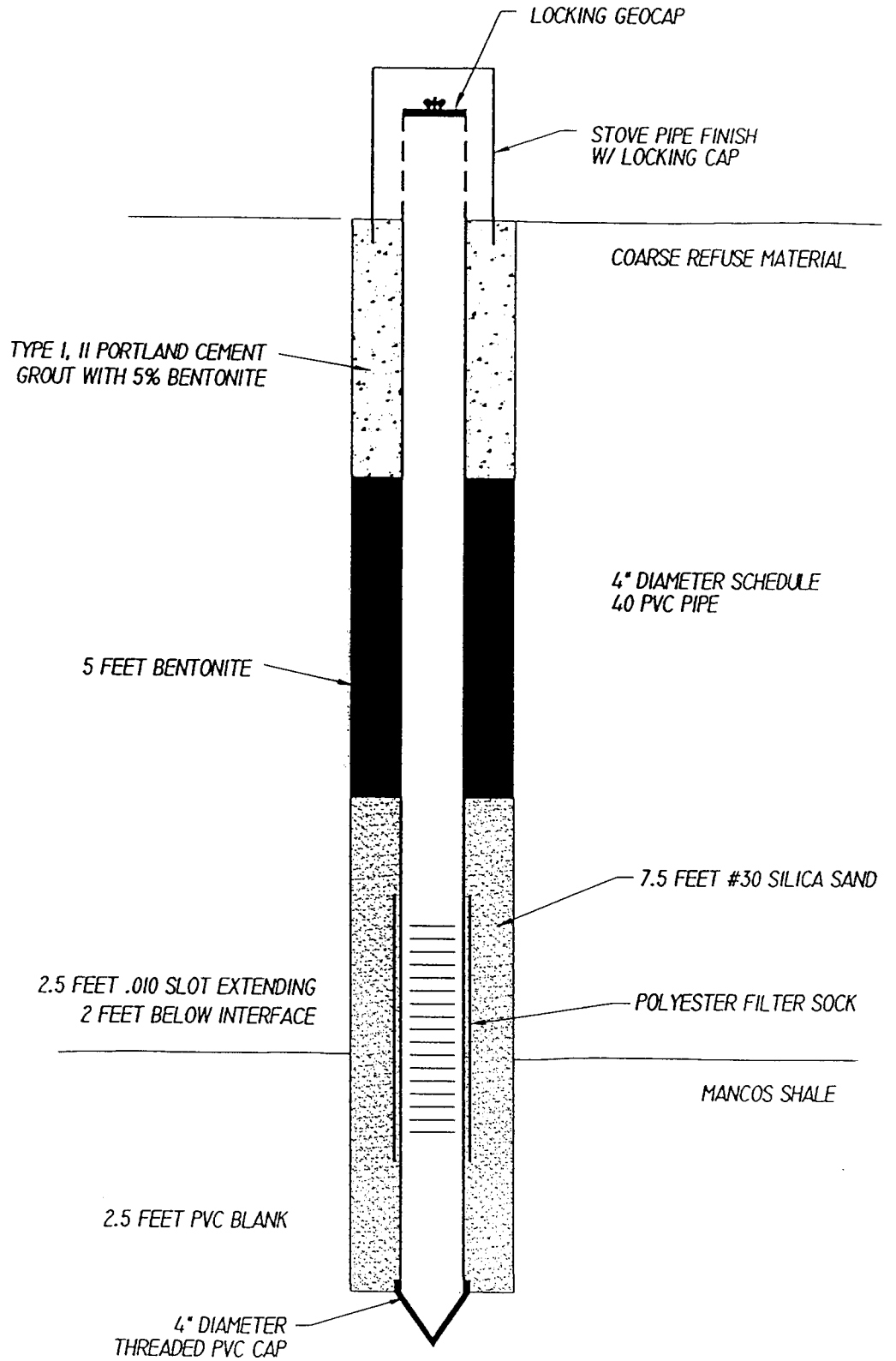
2



ECKHOFF WATSON AND PREATOR ENGINEERING
ENVIRONMENTAL SCIENCES DIVISION

FIGURE 3

SCHEMATIC #1 OF WELL CONSTRUCTION
SUNNYSIDE COGENERATION FACILITY
SUNNYSIDE, UTAH



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ENVIRONMENTAL SCIENCES DIVISION

FIGURE 4

SCHEMATIC #2 OF WELL CONSTRUCTION
SUNNYSIDE COGENERATION FACILITY
SUNNYSIDE, UTAH

APPENDIX A
STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE

RE: PERCUSSION HAMMER - DUAL WALL REVERSE CIRCULATION DRILLING AND SOIL SAMPLING

The percussion hammer - reverse circulation rig uses a 9-7/8 inch diameter dual wall threaded casing that is driven along with the bit as drilling progresses. Each section of drill pipe is 10 feet long, and is connected to each other; this permits a continuous casing to line the bore hole which helps prevent caving and sloughing, which could result in possible cross-contamination within the bore hole. Drill cuttings are discharged through a cyclone that is mounted on the side of the drilling rig. Prior to drilling and soil sampling, all drilling and sampling equipment is steam-cleaned.

During drilling, a geologist, under supervision of a professional engineer or registered geologist, continuously logs each bore hole and collects soil samples. Each soil sample is examined and logged based on soil type, color, consistency or density of soil, moisture condition, any obvious staining, odor, and other field observations. Soil samples are collected by a State of Utah - Certified Soil and Groundwater Sampler.

In-situ soil samples are collected by advancing a split-spoon sampler that contains brass liners into the undisturbed soil beyond the tip of the casing. After the bit and casing reaches the proposed sampling depth, the sampling tube is driven 18 or 24 inches, depending on the length of the sampler, using a 140 lb hammer dropped from a height of 30 inches. The collected soil sample is divided into two parts and transferred from the brass liners to 1-gallon plastic zip-lock bag, sealed shut with the excess air expelled, properly labeled, and stored in a cool dry place. One part of the sample will be delivered or shipped under chain-of-custody to the analytical laboratory for chemical analysis, the other part of the sample will be retained for future reference.

Composite grab soil samples are collected using a clean 5-gallon plastic pail as the cuttings are discharged from the drilling rig's cyclone. The composite grab soil samples are divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place. One part of the sample will be delivered or shipped under chain-of-custody to the analytical laboratory for chemical analysis, the other part of the sample will be retained for future reference.

After collection of each soil sample, the sampling equipment is cleaned with a non-phosphatic detergent solution, and rinsed with clean water. Between each successive soil boring, all drilling and sampling equipment is steam-cleaned to help prevent cross-contamination.

STANDARD OPERATING PROCEDURE

RE: GROUNDWATER SAMPLING PROCEDURES

Upon arrival at a site, all sampling equipment is decontaminated by steam cleaning. Each well to be sampled is checked for the presence of free product using a clear bailer. SWL and TD measurements for the wells to be sampled are used to determine a calculated three-casing purge volume. Water is purged from 4-inch diameter wells using a submersible pump. 2-inch diameter wells are purged using a submersible pump or by hand bailing. Several rounds of water temperature, pH, and electric conductance measurements are often made in the course of purging. Equipment is removed from the well after the calculated purge volume is obtained or the well is pumped dry. Once sufficient recharge of the well has occurred, a sample is collected from the well using a stainless steel or disposable bailer. The water sample is retained in an appropriate container with preservative added, labeled appropriately, and stored on ice. The samples are then transported to a Utah State or EPA certified laboratory for analysis with complete chain-of-custody documentation. Sampling equipment is steam cleaned between wells and all contaminated purge water is contained in a 55-gallon drum(s).

APPENDIX B
LABORATORY ANALYSIS

Laboratory Analysis - West Slurry Cell and Coarse Refuse Material

PARAMETER	SUGGESTED METHODS
• pH	ASA Mono. No. 9, Part 2, (2 ed), 1982. Method 10-3.2, page 171. Perform pH on saturated paste.
• Electrical Conductivity	ASA Mono. Nop. 9, Part 2 (2 ed), 1982. Method 10-3.3, pages 172-173
• Saturation Percentage	SP=100 (total wt of water)/(wt of oven-dry soil).
• Particle Size Analysis (% sand, silt, clay)	Hydrometer method. Black et al. 1965. Methods of soil analysis. ASA Mono No. 9, Part 1, method 43-5, pgs 562-566
• Soluble Ca, Mg, and Na	ASA Mono. No. 9, Part 2, (2ed), 1982, Method 10-3.4. pages 173-174.
• Sodium Adsorption Ration	$[Na^+]/([Ca^{2+} + Mg^{2+}]/2)^{0.5}$
• Selenium	Extraction by ASA Mono. No.9, Part 2 (1 ed), 1965. Method 80-3.2, page 1122. Analyze by hydride generation for AA or ICP. ASA Mono. No. 9, Part 2 (2ed), 1982. Method 3-5.5, pages 59-61.
• Total N	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 31-3, pages 610-616.
• Nitrate-N	ASA Mono. No. 9, Part 2 (2 ed), 1982. Methods 33-4.1, pages 643-645; 33-8.3, pages 679-682 or Sims J.R., and G.D. Jackson. 1977. Soil Sci. Soc. Am. Proc. 35:603-607.
• Boron	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 25-9.1, page 443 for extraction and Method 25-5, pages 443-446 for analysis.
• Maximum Acid Potential*	US EPA. 1978. EPA 600/2-78-054. Method 3.2.6, page 60.

Laboratory Analysis - West Slurry Cell and Coarse Refuse (Continued)

PARAMETER	SUGGESTED METHODS
● Neutralization Potential	US EPA. 1978. EPA 600/2-28-054. Method 3.2.3, page 47.
● Organic Carbon	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 29-3.5.3, pages 571-573.
● Exchangeable Sodium**	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 13-4.4, pages 238-241. Using Flame Emission and using extractatea in method 8-3, page 152.
● Available Water Capacity	USDA SCS Soil Survey Investigation report No. 1, Method 4c1, Page 24.
● Rock Fragments	USDA SCS Soil Survey Investigation report No. 1, Method 3B, Page 18.

* Percent sulfate-sulfur, percent pyritic-sulfur, and % total-sulfur will be determined in reference to the acid potential analysis.

** If the samples have a SAR greater than 12 for clay textured soils or greater than 15 for sandy textured soils, then exchangeable sodium % should be analyzed.

Laboratory Analyses - Suspected Contaminated Layer Underlying The Refuse Material

PARAMETER

1) VIA ATOMIC ABSORPTION

Selenium	Arsenic	Chromium	Nickel
Copper	Cadmium	Zinc	Lead
Molybdenum			

2) VIA ICP SPECTROMETRY

Aluminum	Iron	Cobalt	Manganese
Boron			

3) Alkalinity (CO_3^{2-}, HCO_3^{2-})
4) Exchangeable acidity
5) Chloride
6) Nitrate
7) Sulfate

Monitor Well - Water Sample Analysis

HCO_3^{2-}	CO_3^{2-}	Acidity	Hardness
Oil and Grease	BOD-5 day	TSS	TDS
Ammonia Nitrogen	Nitrite Nitrogen	Total Phenolics	Sulfate
Total Cyanide			

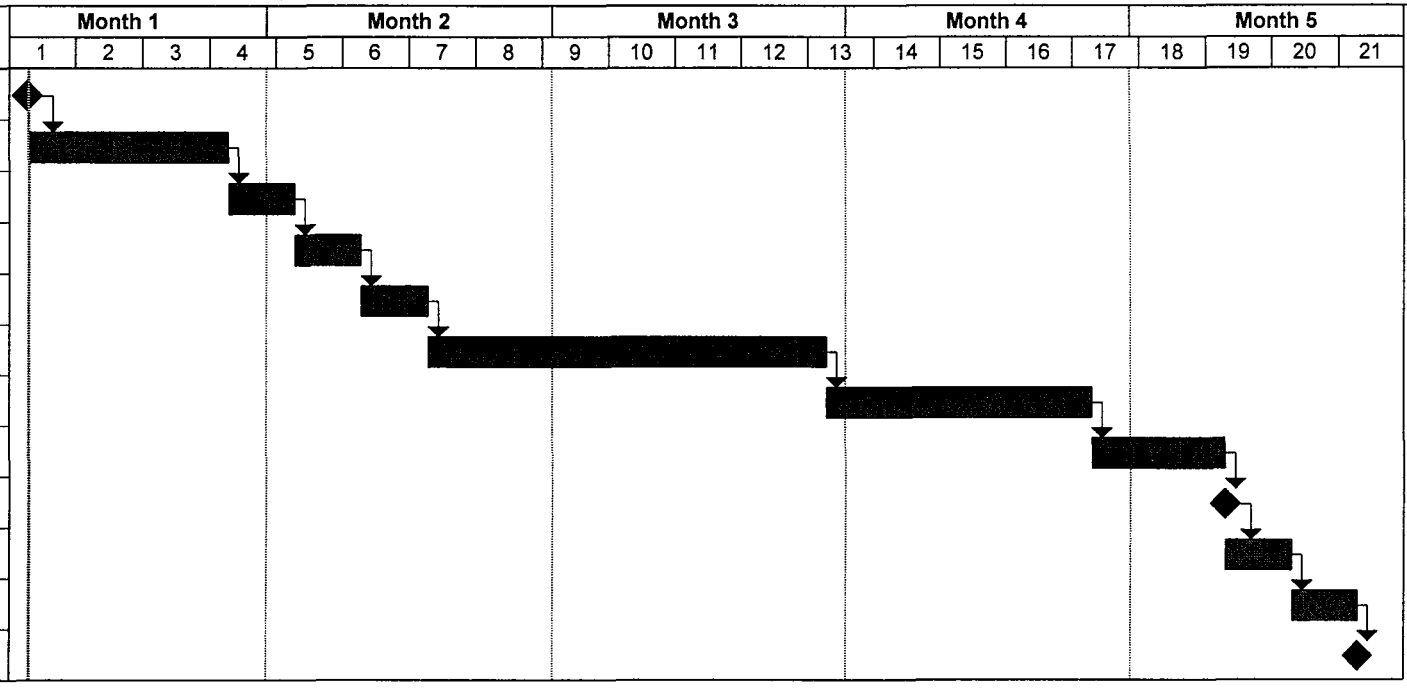
Total and Dissolved Metals

Arsenic	Cadmium	Copper	Lead
Mercury	Selenium	Molybdenum	Potassium
Sodium	Nickel	Aluminum	Boron
Iron	Calcium	Magnesium	Manganese

APPENDIX C
PROPOSED SCHEDULE

SUNNYSIDE COGENERATION ASSOCIATES
SCHEDULE
DRILLING, SAMPLING AND ANALYSIS OF ACID/TOXIC FORMING DATA

ID	Task Name
1	DOGM Review and Acceptance of Plan
2	Obtain Bids from Drillers & Labs
3	Select Drilling Contractor & Lab
4	Mobilization
5	Drilling
6	Testing
7	Analysis
8	Reporting
9	Draft Report to SCA for Review
10	SCA Review
11	Final Report
12	Submit to DOGM



ECKHOFF, WATSON and PREATOR ENGINEERING

APPENDIX 6-5

DRILLING AND SAMPLE COLLECTION

WEST SLURRY CELL AND COARSE REFUSE PILE
SUNNYSIDE COGENERATION ASSOCIATES
CARBON COUNTY, UTAH

APPENDIX 6-5

DRILLING AND SAMPLE COLLECTION

WEST SLURRY CELL AND COARSE REFUSE PILE
SUNNYSIDE COGENERATION ASSOCIATES
CARBON COUNTY, UTAH

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PROPOSED PLAN

Sunnyside Cogeneration Associates (SCA) submits this proposal to satisfy Permit Condition #18, R645-301 Rules, and Division Requirements to Characterize the Refuse Pile. The proposed plan includes drilling six soil borings, collecting soil samples, submitting selected samples for laboratory analysis, and preparating a technical report. The purpose of the plan is to assess whether materials in and immediately under the west slurry cell and coarse refuse pile (slurry and coarse refuse), at the Sunnyside Cogeneration Facility, Carbon County, Utah (Figure 1), are considered potentially toxic- and/or acid-forming. Information gathered from this proposed plan will assist in determining the appropriate methods for reclamation as required by R645-301 and R645-302.

In order to assess whether materials in and beneath the west slurry cell and coarse refuse area are considered potentially toxic- and/or acid-forming, SCA proposes the following:

(1) Drill five soil borings (B-1 through B-5) in the west slurry cell, collect soil samples, and record detailed logs.
(2) Drill one soil boring (B-6) near the bottom of the coarse refuse lifts, and if an adequate quantity of water is encountered, convert it to a small diameter monitor well to monitor water quality on top of the Mancos Shale in that area.
(3) Submit samples from Boreholes B-1 and B-2 for complete analysis as identified under "Sampling Plan" below.
(4) Retain samples from Boreholes B-3, B-4, B-5, and / or B-6.
(5) Compare boring logs and analytical results with information available from the John T. Boyd Drilling of 1991 and 1992.
(6) Identify potentially acid- or toxic-forming strata down to and including the stratum immediately below the refuse material.
(7) Quantify the material identified in #6 above that may require special reclamation considerations.
(8) Prepare a technical report outlining the findings of this plan.

The schedule under which this study will be conducted is presented in Appendix C.

BACKGROUND

Three major drilling investigations were performed on the refuse pile to examine the quantity and quality of the refuse material for use at SCA's electric generating station. Applied Hydrology Associates, Inc. performed their investigation in 1987. John T. Boyd Company (JTBC) performed two investigations, one in 1991 and 1992. In September 1992, JTBC was retained to perform an evaluation of the quantity and quality of fuel material in the Sunnyside Coal refuse pile in the vicinity of the west slurry cell. Numerous exploratory borings were drilled to collect samples for BTU analysis. Duplicate samples were collected, but subsequently misplaced at the analytical laboratory.

The State of Utah-DOGM requires a minimum 4 feet thick cap be placed over acid- or toxic-forming substances in the west slurry cell in order to properly reclaim the cell. However, a cap of less than four feet can be utilized if the underlying materials are shown to be non-toxic and non acid-forming. Sunnyside Cogeneration Association will propose using less than four feet of capping material for reclamation if the results from this study show that the materials exposed at the time of reclamation will not be toxic- or acid-forming.

The criteria used to determine if less than four feet can be used are outlined in the State of Utah - DOGM's, Guideline for Management of Topsoil and Overburden for Underground and Surface Coal Mining, ("Guideline"). According to the "guideline," representative samples should be collected and analyzed for specific parameters to determine if the underlying materials are considered toxic and/or acid-forming. However, because the duplicate samples collected during the fuel evaluation were misplaced at the analytical laboratory, it is necessary to recollect samples of the west slurry cell.

SATISFACTION OF THE R645-301 REGULATIONS

Rule Citation: 645-301-553.252. Following final grading of the refuse pile, the coal mine waste will be covered with a minimum of four feet of the best available, non-toxic and non-combustible material, in a manner that does not impede drainage from the underdrains. The Division may allow less than four feet of cover material based on physical and chemical analyses which show that the requirements of R645-301-244.200 and R645-301-353 through R645-301-357.

Discussion: The six boreholes will provide a look at the material within and under the refuse pile. Physical analyses of all boreholes and chemical analysis of selected boreholes will be performed to show that the requirements of R645-301-244.200 and R645-301-353 through R645-301-357 can be met.

Rule Citation: R645-301-553.300. Exposed coal seams, acid- and toxic-forming materials, and combustible materials exposed, used or produced during mining will be adequately covered with non-toxic and non-combustible materials, or treated, to control the impact on surface and ground water in accordance with R645-301-731.100 through R645-301-731.522 and R645-301-731.800, to prevent sustained combustion, and to minimize adverse effects on plant growth and the approved post-mining land use.

Discussion: The chemical analyses to be performed on the selected samples will determine which of the materials, if any, are acid and toxic-forming. The information obtained will assist in determining adequate management of these materials to control the impact on surface and ground water, prevent sustained combustion, and to minimize adverse effects on plant growth and the approved post-mining land use.

Rule Citation: R645-301-623. Each application will include geologic information in sufficient detail to assist in: 623.100. Determining all potentially acid- or toxic-forming strata down to and including the stratum immediately below the coal seam to be mined; 623.200. Determining whether reclamation as required by R645-301 and R645-302 can be accomplished.

Discussion: The boreholes will be drilled sufficiently into the stratum immediately below the refuse pile to collect samples of the material for analysis. The selected samples will be analyzed for acid- or toxic-forming potential. Information gathered will assist in an assessment of the reclamability of the material.

Rule Citation: R645-301-624.200. . . . For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, samples will be collected and analyzed from test borings; drill cores; or fresh, unweathered, uncontaminated samples from rock outcrops down to and including the deeper of either the stratum immediately below the lowest coal seam to be mined or any aquifer below the lowest coal seam to be mined which may be adversely impacted by mining.

Discussion: Samples from the drilling program will be collected and analyzed from test borings as required in 624.200. Efforts will be made to expedite the process between sampling and analysis. The analysis is expected to assist in identifying the strata that may contain acid- or toxic-forming materials and will include analysis of sulfur. If adequate water is encountered in B-6, a water quality sample will be analyzed. Computer models will be used to assist in quantifying the material underlying the refuse that may require special reclamation considerations.

Permit Condition #18: The permittee must . . . conduct additional analyses, for the purposes of determining the acid and/or toxic and alkalinity forming potential of the existing slurry ponds and coarse refuse pile material. The commitment must include the analysis of all the constituents outlined in the Division's Guidelines for the Management of Topsoil and Overburden, Table 6. The permittee must also specify the sample site locations to be selected . . .

In addition . . . the permittee must submit plans and laboratory results, for inclusion in the PAP, from the above sampling of the refuse and slurry material. Plans must include a discussion of the potential for, and mitigation of, water quality impacts and or revegetation problems attendant to reexcavation and disposal of the coal refuse material.

Discussion: This proposed plan identifies the locations of boreholes to be drilled and selected samples to be analyzed for the purposes of determining the acid and/or toxic and alkalinity forming potential of the refuse material. The analysis identified herein includes all the constituents outlined in the Division's Guidelines for the Management of Topsoil and Overburden, Table 6. This analysis will satisfy Permit Condition #18. Following completion of the proposed work, a technical report will be prepared, for inclusion in the PAP, and will include an analysis of the data, logs of soil borings, analytical results, findings, discussion and summary. The PAP will be revised, if needed, to include a discussion of the potential for, and mitigation of, water quality impacts and/or revegetation problems attendant to reexcavation and disposal of the coal refuse material.

SOIL BORINGS

The proposed soil borings (B-1 through B-5) have been carefully placed in an attempt to increase the possibility of encountering a suspected contaminated soil layer underlying the refuse and identifying the typical variations in thickness of this layer. The proposed borings are spaced throughout the slurry cell to attempt to characterize the subsurface with a minimum number of borings, while still maximizing data.

Proposed soil boring B-6 is located near the bottom of the coarse refuse lifts. This boring will be drilled to the top of the Mancos Shale, in the vicinity of an erosional valley, in an attempt to construct a groundwater monitor well. The purpose of the monitor well is to attempt to measure the quality of water that may be perched on top of the Mancos Shale, and flowing in the erosional valley.

The locations of the proposed borings (B-1 through B-6) are shown on Figure 2. Each soil boring will be drilled into the stratum immediately below the refuse material. The terminal depths of the borings are expected to be between 50 and 200 feet below grade. The drilling of the borings will be supervised and logged by a qualified geologist.

The soil borings will be drilled using a percussion hammer-reverse circulation rig. The percussion hammer rig uses a 9 7/8 inch diameter dual wall threaded casing that is driven along with the bit as drilling progresses. Each section of drill pipe is 10 feet long, and is connected to each other; this permits a continuous casing to line the bore hole which helps prevent caving and sloughing, which could result in possible cross-contamination within the bore hole. Because of the nature and size of the unconsolidated materials being drilled, and the depths of the borings, the percussion hammer rig was selected as the preferred drilling method for this project. A standard operating procedure (SOP) for percussion hammer drilling is included in Appendix A.

Upon completion of the drilling, the open bore holes not used for monitor well completion, will be abandoned using bentonite chips to fill the bore hole. The bentonite chips are hydrated to form a tight seal within the bore hole. This aids in the prevention of potential materials or drainage from migrating downward.

SAMPLING PLAN

West Slurry Cell and Coarse Refuse

Soil samples will be collected from each boring every ten feet as drilling progresses. The soil samples will be collected using a 5-gallon plastic pail as the cuttings are discharged from the drilling rig's cyclone. The soil sample will be divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place.

Selected samples from boreholes B-1 and B-2 will be sent directly to the laboratory (one sample per 20-feet in the refuse material, one sample per five feet of the underlying soil material). The other samples will be retained for future reference for a period of up to six months or until no longer needed. All samples taken will be examined by a qualified geologist to identify physical characteristics.

Samples from B-3 through B-6 will be compared with those encountered in B-1 and B-2. Samples which appear to have similar physical characteristics will be assumed to have similar chemical characteristics and will not need to be analyzed.

All of the samples taken from boreholes B-3 through B-6 will be retained. Efforts will be made to review the analyses from B-1 and B-2 as quickly as possible and determine if any samples from B-3 through B-6 will need to be analyzed for a few specific parameters. Additional samples from B-3 through B-6 will only be analyzed if materials are encountered which have substantially different physical characteristics and are suspected to require special reclamation considerations.

The soil samples to be analyzed will be sent under chain of custody to a Utah State or EPA Certified soils laboratory for analysis of the parameters identified in Appendix B, using the methodologies in accordance with the DOGM's guideline, Table 6.

Soil Layer Underlying The Refuse Material

Located on the southern slope of the east slurry cell is an orange-yellow layer that has cropped out in isolated spots. In an attempt to quantify the presence, areal extent, and composition of the suspected material, in-situ soil samples will be collected while drilling, if the suspected layer is encountered. Soil samples will be collected every 5-feet while drilling progresses through this layer.

The soil samples will be collected by advancing a 2-inch diameter, 24-inch long split-barrel sample tube, that contains brass liners, into the undisturbed soil beyond the bottom of the drill casing. After the drill casing reaches the proposed sampling depth, the sample tube is driven 24 inches using a 140 lb hammer that is dropped from a height of 30 inches. The collected soil sample will be divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place.

Selected samples from boreholes B-1 and B-2 will be sent directly to the laboratory (one sample per 20-feet in the refuse material, one sample per five feet of the underlying soil material). All samples not sent for analysis will be retained for future reference for a period of up to six months or until no longer needed. The soil samples will be sent under chain of custody to a Utah State or EPA Certified Soils Laboratory for chemical analysis.

At the analytical laboratory, the soil samples collected from the underlying soil layer will be prepared for analysis using the following techniques:

1) air drying the samples for 24-hours;
2) mechanically grinding the samples in order to pass through a 2-mm (10-mesh) stainless steel sieve;
3) mixing the ground samples with deionized water with an electrical conductivity of $\leq$ 2 mmhos/cm and covering with an airtight lid and allowed to sit 24 hours to establish an equilibrium between the soil and water;
4) the liquid will then be collected for the requested analyses.

An extract, of the collected liquid, will be analyzed for the parameters outlined in Appendix B. The parameters to be analyzed and laboratory methodologies were agreed upon by DOGM at the February 2, 1994 meeting.

In addition to the analyses listed in Appendix B for the liquid extract portion, one sample from B-1 and one from B-2 collected from the underlying layer will be analyzed for total arsenic, total cadmium, total chromium, and total selenium.

According to Mr. Don Verbica of the State of Utah-Division of Solid and Hazardous (DSHW), to estimate if a known (total) concentration of a metal might be near its respective TCLP-MCL, a factor of 20 times the TCLP-MCL for water may be used as an upper (total) MCL. If the total concentration for a collected soil sample exceeds 20 times the TCLP-MCL for water, for the metal in question, then a TCLP analysis will be performed on the sample which had a high metals concentration.

POSSIBLE MONITOR WELL CONSTRUCTION - Borehole B-6

Two alternatives for monitoring wells are proposed; the design utilized will be based on the subsurface conditions at the time of drilling. If a perched water bearing zone, of sufficient thickness is encountered on the surface of the Mancos Shale, a groundwater monitor well will be constructed as shown on Figure 3. If a perched water bearing zone of sufficient thickness is not encountered, the groundwater monitor well will be constructed as shown on Figure 4. The design shown on Figure 4 will permit water, that may be flowing on top of the Mancos Shale, to collect in the bottom of the casing, so a water sample can be collected for analysis. If insufficient water is encountered in B-6 to ensure the success of a monitoring well installation, no well will be constructed.

The monitor well is designed to be constructed with 2-inch diameter threaded, factory perforated and blank, schedule-40 PVC pipe. The screened interval is above the upper surface of the Mancos Shale. The precise length of the screened portion is dependent on the thickness of the water bearing zone encountered. The screened portion of the monitor well will consist of at least 2.5 feet of 0.010-inch slot, that is wrapped by a knitted polyester filter sock, designed to help prevent coal fines in the subsurface from entering the well screen. A threaded PVC cap is fastened to the bottom of the casing, solvents or cements are not used. The well casing is thoroughly washed and steam-cleaned prior to installation.

After setting the casing inside the bore hole, #30 silica sand is tremied or poured into the annular space from the bottom of the boring to 2 feet above the perforated interval. A 5 foot thick bentonite plug is placed above the filter material to prevent grout from infiltrating into the filter material. A type I/II portland cement mixture with 5% bentonite is tremied into the annular space from the top of the bentonite plug to the ground surface. A steel stove pipe is set over the wellhead and cemented into place.

Upon completion of the new monitor well, the top-of-casing (TOC) will be surveyed to mean-sea-level (MSL), relative to a known elevation benchmark. The monitor well will be developed by the drilling contractor using a submersible pump and/or airlift techniques until relatively clear, sand/silt free water is produced.

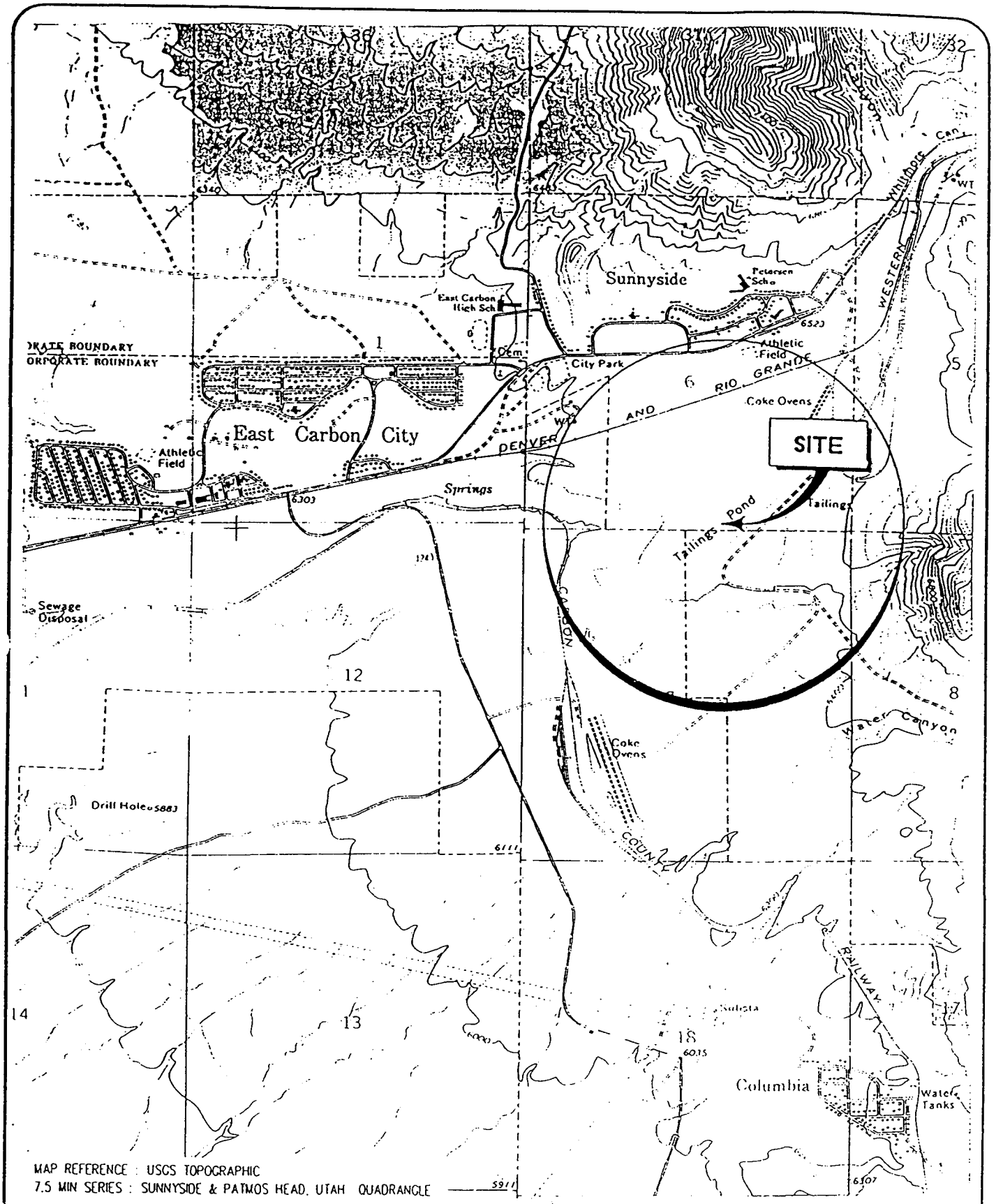
Monitor well sampling

If adequate water is encountered, a representative water sample will be collected from the newly installed monitor well. A SOP for groundwater monitoring is presented in Appendix A. During purging and sampling of the monitor well, pH, temperature, specific conductivity, and dissolved oxygen will be measured and recorded. The collected water sample will be shipped under chain-of custody to a Utah State or EPA certified laboratory for analysis. The water sample will be analyzed for the parameters outlined in Appendix B using the appropriate EPA method.

TECHNICAL REPORT

Following completion of the proposed work, a technical report will be prepared, for inclusion in the PAP, and will include an analysis of the data, logs of soil borings, analytical results, findings, discussion and summary. The PAP will be revised, if needed, to include a discussion of the potential for, and mitigation of, water quality impacts and/or revegetation problems attendant to reexcavation and disposal of the coal refuse material in the excess spoil area.

FIGURES

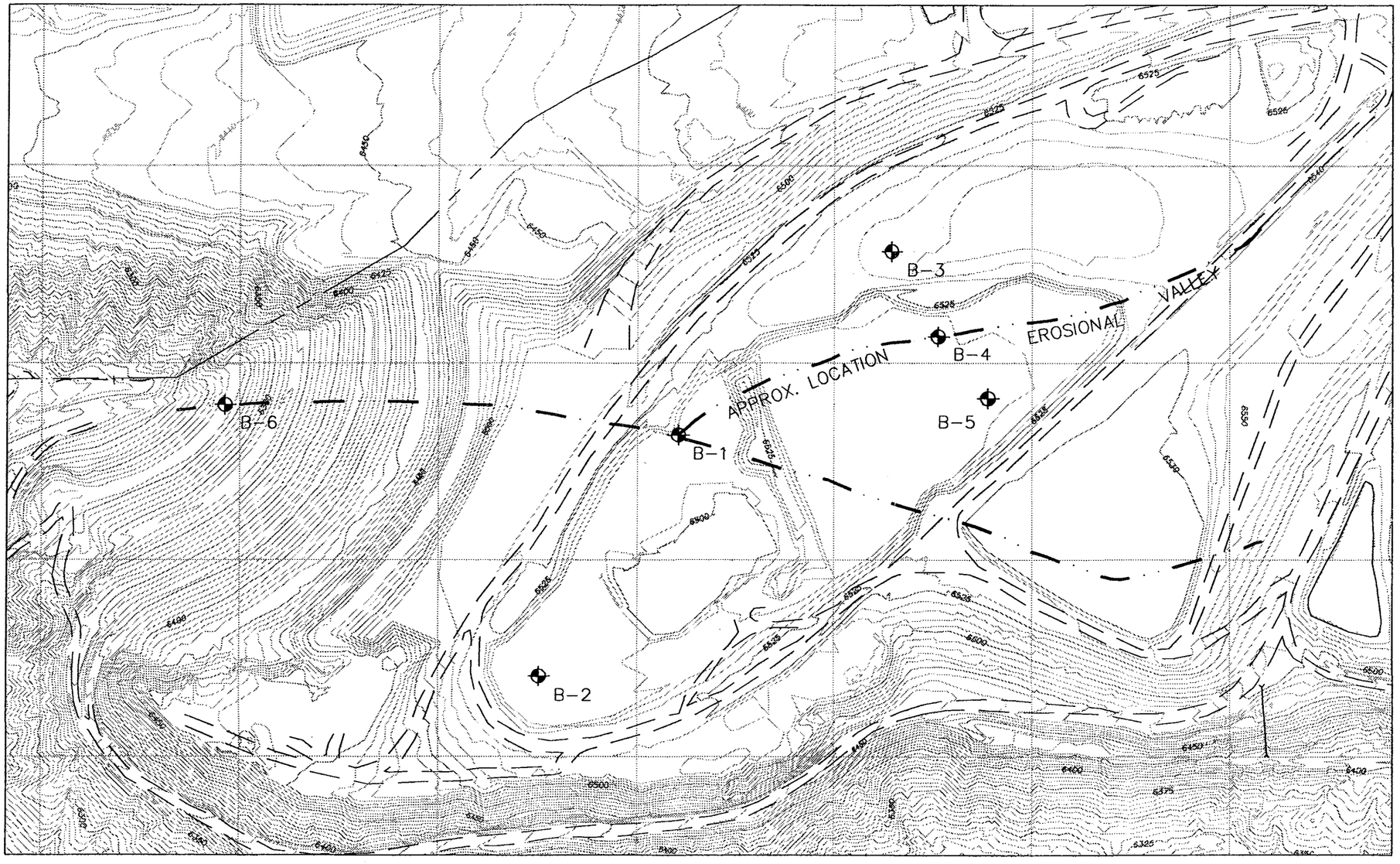


MAP REFERENCE : USGS TOPOGRAPHIC
7.5 MIN SERIES : SUNNYSIDE & PATMOS HEAD, UTAH QUADRANGLE

ECKHOFF WATSON AND PREATOR ENGINEERING
ENGINEERS PLANNERS SURVEYORS

FIGURE 1

SITE LOCATION MAP
SUNNYSIDE COGENERATION FACILITY
CARBON, COUNTY, UTAH



GRAPHIC SCALE

300 0 150 300 600

(IN FEET)

1 inch = 300ft.

LEGEND

- PERMIT BOUNDARY
- EROSIONAL VALLEY
- ROAD
- B-1 PROPOSED BORING LOCATION

Date

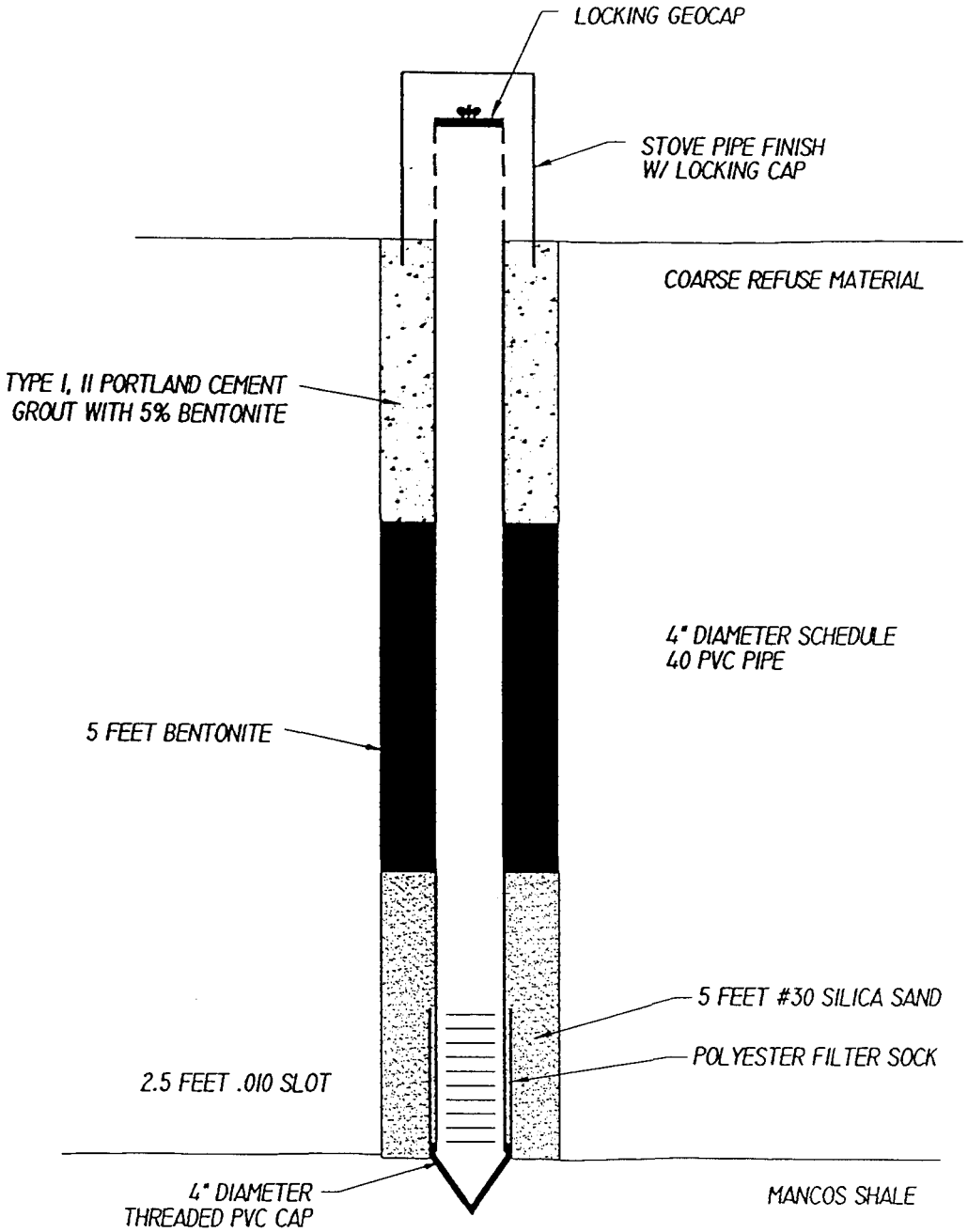
No.	Revision	By	Date
1	REV BORING LOCATIONS	AH	3/95

Project Number EC450593
Designed By AEB
Drawn By AH
Checked By AEB Date 2/94

ECKHOFF WATSON AND PREATOR ENGINEERING
ENGINEERS PLANNERS SURVEYORS SALT LAKE CITY

SUNNYSIDE COGENERATION ASSOCIATES
SUNNYSIDE COGENERATION FACILITY, CARBON COUNTY, UTAH
PROPOSED BORING LOCATIONS

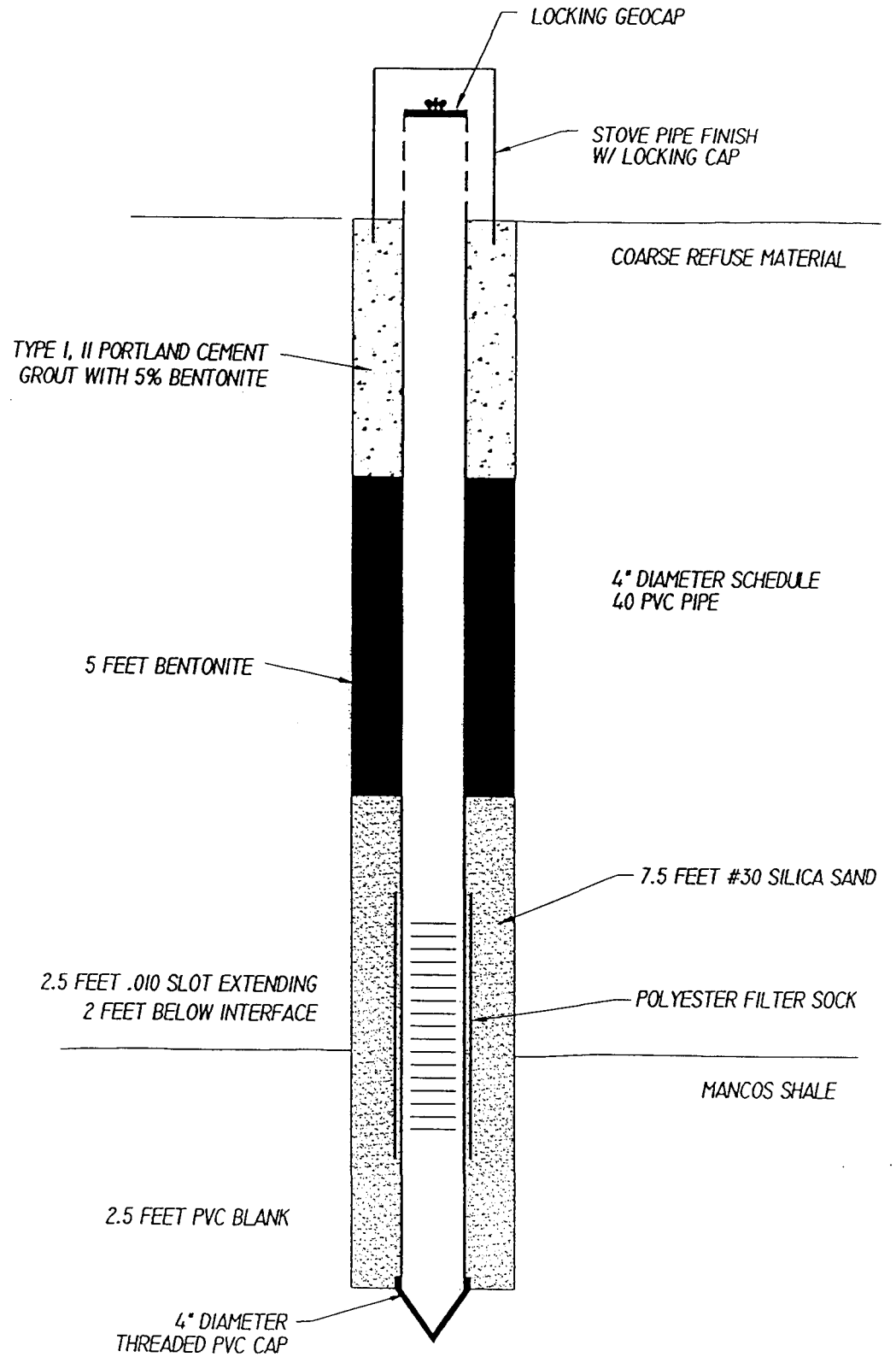
2



ECKHOFF WATSON AND PREATOR ENGINEERING
ENVIRONMENTAL SCIENCES DIVISION

FIGURE 3

SCHEMATIC #1 OF WELL CONSTRUCTION
SUNNYSIDE COGENERATION FACILITY
SUNNYSIDE, UTAH



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ENVIRONMENTAL SCIENCES DIVISION

FIGURE 4

SCHEMATIC #2 OF WELL CONSTRUCTION
SUNNYSIDE COGENERATION FACILITY
SUNNYSIDE, UTAH

APPENDIX A
STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE

RE: PERCUSSION HAMMER - DUAL WALL REVERSE CIRCULATION DRILLING AND SOIL SAMPLING

The percussion hammer - reverse circulation rig uses a 9-7/8 inch diameter dual wall threaded casing that is driven along with the bit as drilling progresses. Each section of drill pipe is 10 feet long, and is connected to each other; this permits a continuous casing to line the bore hole which helps prevent caving and sloughing, which could result in possible cross-contamination within the bore hole. Drill cuttings are discharged through a cyclone that is mounted on the side of the drilling rig. Prior to drilling and soil sampling, all drilling and sampling equipment is steam-cleaned.

During drilling, a geologist, under supervision of a professional engineer or registered geologist, continuously logs each bore hole and collects soil samples. Each soil sample is examined and logged based on soil type, color, consistency or density of soil, moisture condition, any obvious staining, odor, and other field observations. Soil samples are collected by a State of Utah - Certified Soil and Groundwater Sampler.

In-situ soil samples are collected by advancing a split-spoon sampler that contains brass liners into the undisturbed soil beyond the tip of the casing. After the bit and casing reaches the proposed sampling depth, the sampling tube is driven 18 or 24 inches, depending on the length of the sampler, using a 140 lb hammer dropped from a height of 30 inches. The collected soil sample is divided into two parts and transferred from the brass liners to 1-gallon plastic zip-lock bag, sealed shut with the excess air expelled, properly labeled, and stored in a cool dry place. One part of the sample will be delivered or shipped under chain-of-custody to the analytical laboratory for chemical analysis, the other part of the sample will be retained for future reference.

Composite grab soil samples are collected using a clean 5-gallon plastic pail as the cuttings are discharged from the drilling rig's cyclone. The composite grab soil samples are divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place. One part of the sample will be delivered or shipped under chain-of-custody to the analytical laboratory for chemical analysis, the other part of the sample will be retained for future reference.

After collection of each soil sample, the sampling equipment is cleaned with a non-phosphatic detergent solution, and rinsed with clean water. Between each successive soil boring, all drilling and sampling equipment is steam-cleaned to help prevent cross-contamination.

STANDARD OPERATING PROCEDURE

RE: GROUNDWATER SAMPLING PROCEDURES

Upon arrival at a site, all sampling equipment is decontaminated by steam cleaning. Each well to be sampled is checked for the presence of free product using a clear bailer. SWL and TD measurements for the wells to be sampled are used to determine a calculated three-casing purge volume. Water is purged from 4-inch diameter wells using a submersible pump. 2-inch diameter wells are purged using a submersible pump or by hand bailing. Several rounds of water temperature, pH, and electric conductance measurements are often made in the course of purging. Equipment is removed from the well after the calculated purge volume is obtained or the well is pumped dry. Once sufficient recharge of the well has occurred, a sample is collected from the well using a stainless steel or disposable bailer. The water sample is retained in an appropriate container with preservative added, labeled appropriately, and stored on ice. The samples are then transported to a Utah State or EPA certified laboratory for analysis with complete chain-of-custody documentation. Sampling equipment is steam cleaned between wells and all contaminated purge water is contained in a 55-gallon drum(s).

APPENDIX B
LABORATORY ANALYSIS

Laboratory Analysis - West Slurry Cell and Coarse Refuse Material

PARAMETER	SUGGESTED METHODS
• pH	ASA Mono. No. 9, Part 2, (2 ed), 1982. Method 10-3.2, page 171. Perform pH on saturated paste.
• Electrical Conductivity	ASA Mono. Nop. 9, Part 2 (2 ed), 1982. Method 10-3.3, pages 172-173
• Saturation Percentage	SP=100 (total wt of water)/(wt of oven-dry soil).
• Particle Size Analysis (% sand, silt, clay)	Hydrometer method. Black et al. 1965. Methods of soil analysis. ASA Mono No. 9, Part 1, method 43-5, pgs 562-566
• Soluble Ca, Mg, and Na	ASA Mono. No. 9, Part 2, (2ed), 1982, Method 10-3.4. pages 173-174.
• Sodium Adsorption Ration	$[Na^+]/([Ca^{2+} + Mg^{2+}]/2)^{0.5}$
• Selenium	Extraction by ASA Mono. No.9, Part 2 (1 ed), 1965. Method 80-3.2, page 1122. Analyze by hydride generation for AA or ICP. ASA Mono. No. 9, Part 2 (2ed), 1982. Method 3-5.5, pages 59-61.
• Total N	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 31-3, pages 610-616.
• Nitrate-N	ASA Mono. No. 9, Part 2 (2 ed), 1982. Methods 33-4.1, pages 643-645; 33-8.3, pages 679-682 or Sims J.R., and G.D. Jackson. 1977. Soil Sci. Soc. Am. Proc. 35:603-607.
• Boron	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 25-9.1, page 443 for extraction and Method 25-5, pages 443-446 for analysis.
• Maximum Acid Potential*	US EPA. 1978. EPA 600/2-78-054. Method 3.2.6, page 60.

Laboratory Analysis - West Slurry Cell and Coarse Refuse (Continued)

PARAMETER	SUGGESTED METHODS
• Neutralization Potential	US EPA. 1978. EPA 600/2-28-054. Method 3.2.3, page 47.
• Organic Carbon	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 29-3.5.3, pages 571-573.
• Exchangeable Sodium**	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 13-4.4, pages 238-241. Using Flame Emission and using extractatea in method 8-3, page 152.
• Available Water Capacity	USDA SCS Soil Survey Investigation report No. 1, Method 4c1, Page 24.
• Rock Fragments	USDA SCS Soil Survey Investigation report No. 1, Method 3B, Page 18.

* Percent sulfate-sulfur, percent pyritic-sulfur, and % total-sulfur will be determined in reference to the acid potential analysis.

** If the samples have a SAR greater than 12 for clay textured soils or greater than 15 for sandy textured soils, then exchangeable sodium % should be analyzed.

Laboratory Analyses - Suspected Contaminated Layer Underlying The Refuse Material

PARAMETER

1) VIA ATOMIC ABSORPTION

Selenium	Arsenic	Chromium	Nickel
Copper	Cadmium	Zinc	Lead
Molybdenum			

2) VIA ICP SPECTROMETRY

Aluminum	Iron	Cobalt	Manganese
Boron			

3) Alkalinity (CO_3^{2-}, HCO_3^{2-})
4) Exchangeable acidity
5) Chloride
6) Nitrate
7) Sulfate

Monitor Well - Water Sample Analysis

HCO_3^{2-}	CO_3^{2-}	Acidity	Hardness
Oil and Grease	BOD-5 day	TSS	TDS
Ammonia Nitrogen	Nitrite Nitrogen	Total Phenolics	Sulfate
Total Cyanide			

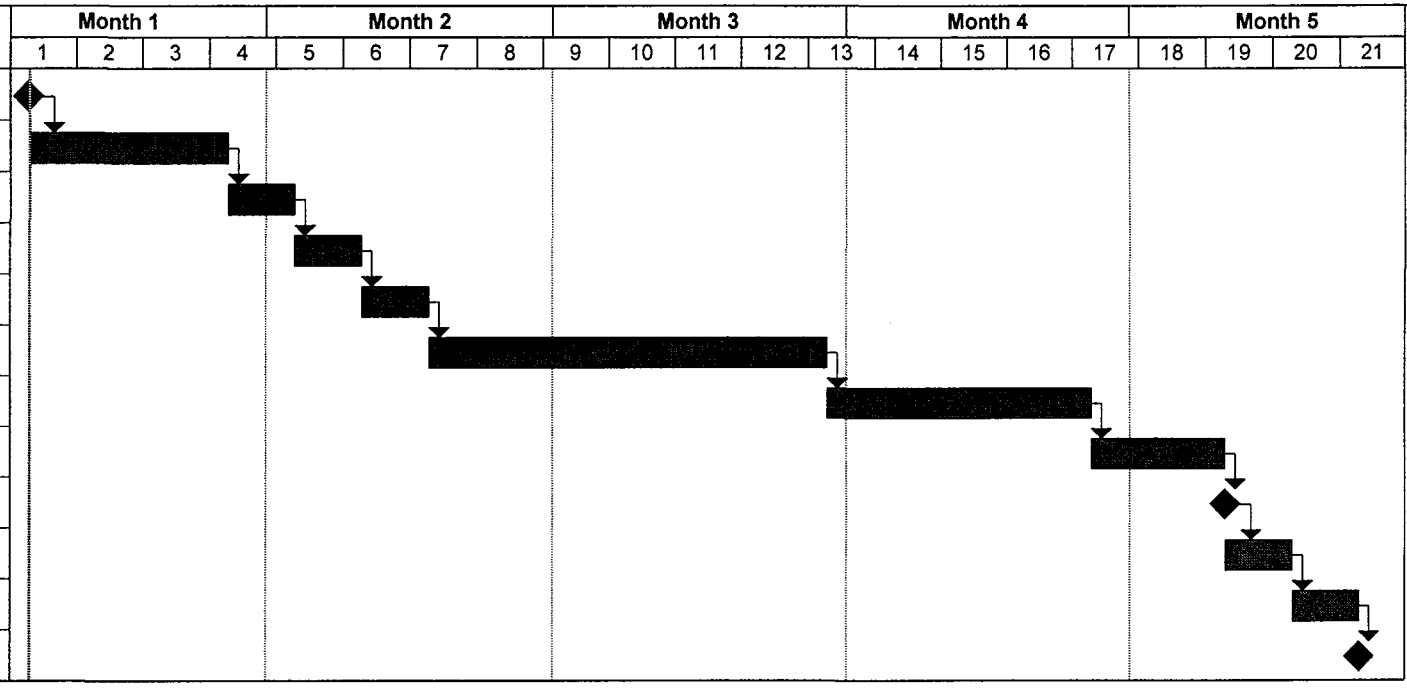
Total and Dissolved Metals

Arsenic	Cadmium	Copper	Lead
Mercury	Selenium	Molybdenum	Potassium
Sodium	Nickel	Aluminum	Boron
Iron	Calcium	Magnesium	Manganese

APPENDIX C
PROPOSED SCHEDULE

SUNNYSIDE COGENERATION ASSOCIATES
SCHEDULE
DRILLING, SAMPLING AND ANALYSIS OF ACID/TOXIC FORMING DATA

ID	Task Name
1	DOGM Review and Acceptance of Plan
2	Obtain Bids from Drillers & Labs
3	Select Drilling Contractor & Lab
4	Mobilization
5	Drilling
6	Testing
7	Analysis
8	Reporting
9	Draft Report to SCA for Review
10	SCA Review
11	Final Report
12	Submit to DOGM



ECKHOFF, WATSON and PREATOR ENGINEERING

(Last Revised 6/93)

File Folder # 3

PERMIT CHANGE TRACKING FORM

DATE RECEIVED	3/8/95	PERMIT NUMBER	ACT/007/035
Title of Proposal:	Refuse Pile & Weste	PERMIT CHANGE #	95C
Description:	Slurry Cell Construction Meeting on 3/28 - Read 4/5/95	PERMITTEE	SCA
		MINE NAME	Skyline Refuse Slurry

	DATE DUE	DATE DONE	RESULT
☐ 15 DAY INITIAL RESPONSE TO PERMIT CHANGE APPLICATION			☐ ACCEPTED ☐ REJECTED
☐ Notice of Review Status of proposed permit change sent to the Permittee.			
☐ Request additional review copies prior to Division/Other Agency review.			
☐ Notice of Approval of Publication. (If change is a Significant Revision.)			
☐ Notice of request to modify proposed permit change prior to approval.			

Permit Change Classification

- ☐ Significant Permit Revision
- ☐ Permit Amendment
- ☐ Incidental Boundary Change

REVIEW TRACKING	INITIAL REVIEW		MODIFIED REVIEW		FINAL REVIEW AND FINDINGS	
DOGM REVIEWER	DUE	DONE	DUE	DONE	DUE	DONE
☐ Administrative ____						
☐ Biology ____						
☐ Engineering ____						
☐ Geology ____						
☐ Soils HS	5/12	4/26				
☐ Hydrology ____						
☐ Bonding ____						
☐ AVS Check ____						

COORDINATED REVIEWS	DUE	DONE	DUE	DONE	DUE	DONE
☐ OSMRE						
☐ US Forest Service						
☐ Bureau of Land Management						
☐ US Fish and Wildlife Service						
☐ US National Parks Service						
☐ UT Environmental Quality						
☐ UT Water Resources						
☐ UT Water Rights						
☐ UT Wildlife Resources						
☐ UT State History						
☐ Other						

☐ Public Notice/Comment/Hearing Complete (If the permit change is a Significant Revision)		☐ Permit Change Approval Form signed and approved effective as of this date. ☐ Permit Change Denied.	
☐ Copies of permit change marked and ready for MRP.		☐ Notice of ☐ Approval ☐ Denial to Permittee.	
☐ Special Conditions/Stipulations written for approval.		☐ Copy of Approved Permit Change to File.	
☐ TA and CHIA modified as required.		☐ Copy of Approved Permit Change to Permittee.	
☐ Permit Change Approval Form ready for approval.		☐ Copies to Other Agencies and Price Field Office.	

SUNNYSIDE COGENERATION FACILITY
Sunnyside Operations Associates, L.P.
Post Office Box 10
East Carbon, Utah 84520
(801) 888-4476
(801) 888-2538 fax

April 10, 1995

95C

Ms. Pamela Grubaugh-Littig
Division of Oil, Gas and Mining
3 Triad Center - Suite 350
Salt Lake City, Utah 84180-1203

#2

RE: Permit No. ACT/007/035: Sunnyside Cogeneration Associates
Permit Submittal: NOV N93-13-2-1, Permit Condition #18
Engineer's Project No. EC450593

Copy Dave

Dear Pam,

This submittal includes a revision to PAP Appendix 6-5 which details the plan for characterization of the Refuse Pile/West Slurry Cell to meet requirements of NOV N93-13-2-1, and Permit Condition #18. The revisions reflect the concepts as discussed and agreed in a meeting with Henry Sauer at DOGM on March 28, 1995. Please review these revisions as quickly as possible so that SCA can proceed with the work planned.

If you have any questions concerning this submittal, please feel free to call the SCA Plant Manager, at (801) 888-4476.

Sincerely,

Thomas G. Eckstein
Acting Plant Manager

TGE/lls

Attachments

c.c. Bob Evans, NRG
Jim O'Donnell, NRG
Doug Burnham, B&W
Alane E. Boyd, EWP
Brian Burnett, CNM
Bill Malencik, DOGM
Henry Sauer, DOGM
Joe Helfrich, DOGM (letter)

APPENDIX 6-5

DRILLING AND SAMPLE COLLECTION

WEST SLURRY CELL AND COARSE REFUSE PILE
SUNNYSIDE COGENERATION ASSOCIATES
CARBON COUNTY, UTAH

APPENDIX 6-5

DRILLING AND SAMPLE COLLECTION

WEST SLURRY CELL AND COARSE REFUSE PILE
SUNNYSIDE COGENERATION ASSOCIATES
CARBON COUNTY, UTAH

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PROPOSED PLAN

Sunnyside Cogeneration Associates (SCA) submits this proposal to satisfy Permit Condition #18, R645-301 Rules, and Division Requirements to Characterize the Refuse Pile. The proposed plan includes drilling six soil borings, collecting soil samples, submitting selected samples for laboratory analysis, and preparing a technical report. The purpose of the plan is to assess whether materials in and immediately under the west slurry cell and coarse refuse pile (slurry and coarse refuse), at the Sunnyside Cogeneration Facility, Carbon County, Utah (Figure 1), are considered potentially toxic- and/or acid-forming. Information gathered from this proposed plan will assist in determining the appropriate methods for reclamation as required by R645-301 and R645-302.

In order to assess whether materials in and beneath the west slurry cell and coarse refuse area are considered potentially acid- and/or toxic-forming, SCA proposes the following:

(1) Drill five soil borings (B-1 through B-5) in the west slurry cell, collect soil samples, and record detailed logs.
(2) Drill one soil boring (B-6) near the bottom of the coarse refuse lifts, and if an adequate quantity of water is encountered, convert it to a small diameter monitor well to monitor water quality on top of the Mancos Shale in that area.
(3) Submit samples from Boreholes B-1 and B-2 and from the underlying material in B-4 and B-6 for analysis as identified under "Sampling Plan" below.
(4) Air dry and retain samples from Boreholes B-3, B-4, B-5, and ~~/ or~~ B-6.
(5) Compare boring logs and analytical results with information available from the John T. Boyd Drilling of 1991 and 1992.
(6) Identify potentially acid- and/or toxic-forming strata down to and including the stratum immediately below the refuse material.
(7) Quantify the material identified in #6 above that may require special reclamation considerations.
(8) Prepare a technical report outlining the findings of this plan.

The schedule under which this study will be conducted is presented in Appendix C.

BACKGROUND

Three major drilling investigations were performed on the refuse pile to examine the quantity and quality of the refuse material for use at SCA's electric generating station. Applied Hydrology Associates, Inc. performed their investigation in 1987. John T. Boyd Company (JTBC) performed two investigations, one in 1991 and 1992. In September 1992, JTBC was retained to perform an evaluation of the quantity and quality of fuel material in the Sunnyside Coal refuse pile in the vicinity of the west slurry cell. Numerous exploratory borings were drilled to collect samples for BTU analysis. Duplicate samples were collected, but subsequently misplaced at the analytical laboratory.

The State of Utah-DOGM requires a minimum 4 feet thick cap be placed over acid- or toxic-forming substances in the west slurry cell in order to properly reclaim the cell. However, a cap of less than four feet can be utilized if the underlying materials are shown to be non-toxic and non acid-forming. Sunnyside Cogeneration Association will propose using less than four feet of capping material for reclamation if the results from this study show that the materials exposed at the time of reclamation will not be toxic- or acid-forming.

The criteria used to determine if less than four feet can be used are outlined in the State of Utah - DOGM's, Guideline for Management of Topsoil and Overburden for Underground and Surface Coal Mining, ("Guideline"). According to the "guideline," representative samples should be collected and analyzed for specific parameters to determine if the underlying materials are considered to be acid- and/or toxic-forming. However, because the duplicate samples collected during the fuel evaluation were misplaced at the analytical laboratory, it is necessary to recollect samples of the west slurry cell.

SATISFACTION OF THE R645-301 REGULATIONS

Rule Citation: 645-301-553.252. Following final grading of the refuse pile, the coal mine waste will be covered with a minimum of four feet of the best available, non-toxic and non-combustible material, in a manner that does not impede drainage from the underdrains. The Division may allow less than four feet of cover material based on physical and chemical analyses which show that the requirements of R645-301-244.200 and R645-301-353 through R645-301-357.

Discussion: The six boreholes will provide a look at the material within and under the refuse pile. Physical analyses of all boreholes and chemical analysis of selected boreholes will be performed to show that the requirements of R645-301-244.200 and R645-301-353 through R645-301-357 can be met.

Rule Citation: R645-301-553.300. Exposed coal seams, acid- and toxic-forming materials, and combustible materials exposed, used or produced during mining will be adequately covered with non-toxic and non-combustible materials, or treated, to control the impact on surface and ground water in accordance with R645-301-731.100 through R645-301-731.522 and R645-301-731.800, to prevent sustained combustion, and to minimize adverse effects on plant growth and the approved post-mining land use.

Discussion: The chemical analyses to be performed on the selected samples will determine which of the materials, if any, are acid- and/or toxic-forming. The information obtained will assist in determining adequate management of these materials to control the impact on surface and ground water, prevent sustained combustion, and to minimize adverse effects on plant growth and the approved post-mining land use.

Rule Citation: R645-301-623. Each application will include geologic information in sufficient detail to assist in: 623.100. Determining all potentially acid- or toxic-forming strata down to and including the stratum immediately below the coal seam to be mined; 623.200. Determining whether reclamation as required by R645-301 and R645-302 can be accomplished.

Discussion: The boreholes will be drilled sufficiently into the stratum immediately below the refuse pile to collect samples of the material for analysis. The selected samples will be analyzed for acid- or toxic-forming potential. Information gathered will assist in an assessment of the reclamability of the material.

Rule Citation: R645-301-624.200. . . . For the purposes of SURFACE COAL MINING AND RECLAMATION ACTIVITIES, samples will be collected and analyzed from test borings; drill cores; or fresh, unweathered, uncontaminated samples from rock outcrops down to and including the deeper of either the stratum immediately below the lowest coal seam to be mined or any aquifer below the lowest coal seam to be mined which may be adversely impacted by mining.

Discussion: Samples from the drilling program will be collected and analyzed from test boring as required in 624.200. Efforts will be made to expedite the process between sampling and analysis. The analysis is expected to assist in identifying the strata that may contain acid- and/or toxic-forming materials and will include analysis of sulfur. If adequate water is encountered in B-6, a water quality sample will be analyzed. Computer models will be used to assist in quantifying the material underlying the refuse that may require special reclamation considerations.

Permit Condition #18: The permittee must . . . conduct additional analyses, for the purposes of determining the acid and/or toxic and alkalinity forming potential of the existing slurry ponds and coarse refuse pile material. The commitment must include the analysis of all the constituents outlined in the Division's Guidelines for the Management of Topsoil and Overburden, Table 6. The permittee must also specify the sample site locations to be selected . . .

In addition . . . the permittee must submit plans and laboratory results, for inclusion in the PAP, from the above sampling of the refuse and slurry material. Plans must include a discussion of the potential for, and mitigation of, water quality impacts and or revegetation problems attendant to re-excavation and disposal of the coal refuse material.

Discussion: This proposed plan identifies the locations of boreholes to be drilled and selected samples to be analyzed for the purposes of determining the acid and/or toxic and alkalinity forming potential of the refuse material. The analysis identified herein includes all the constituents outlined in the Division's Guidelines for the Management of Topsoil and Overburden, Table 6. This analysis will satisfy Permit Condition #18. Following completion of the proposed work, a technical report will be prepared, for inclusion in the PAP, and will include an analysis of the data, logs of soil boring, analytical results, findings, discussion and summary. The PAP will be revised, if needed, to include a discussion of the potential for, and mitigation of, water quality impacts and/or revegetation problems attendant to re-excavation and disposal of the coal refuse material.

SOIL BORING

The proposed soil borings (B-1 through B-5) have been carefully placed in an attempt to increase the possibility of encountering a suspected contaminated soil layer underlying the refuse and identifying the typical variations in thickness of this layer. The proposed borings are spaced throughout the slurry cell to attempt to characterize the subsurface with a minimum number of borings, while still maximizing data.

Proposed soil boring B-6 is located near the bottom of the coarse refuse lifts. This boring will be drilled to the top of the Mancos Shale, in the vicinity of an erosional valley, in an attempt to construct a groundwater monitor well. The purpose of the monitor well is to attempt to measure the quality of water that may be perched on top of the Mancos Shale, and flowing in the erosional valley.

The locations of the proposed borings (B-1 through B-6) are shown on Figure 2. Each soil boring will be drilled into the stratum immediately below the refuse material. The terminal depths of the borings are expected to be between 50 and 200 feet below grade. The drilling of the borings will be supervised and logged by a qualified geologist.

The soil borings will be drilled using a percussion hammer-reverse circulation rig. The percussion hammer rig uses a 9 7/8 inch diameter dual wall threaded casing that is driven along with the bit as drilling progresses. Each section of drill pipe is 10 feet long, and is connected to each other; this permits a continuous casing to line the bore hole which helps prevent caving and sloughing, which could result in possible cross-contamination within the bore hole. Because of the nature and size of the unconsolidated materials being drilled, and the depths of the borings, the percussion hammer rig was selected as the preferred drilling method for this project. A standard operating procedure (SOP) for percussion hammer drilling is included in Appendix A.

Upon completion of the drilling, the open bore holes not used for monitor well completion, will be abandoned using bentonite chips to fill the bore hole. The bentonite chips are hydrated to form a tight seal within the bore hole. This aids in the prevention of potential materials or drainage from migrating downward.

SAMPLING PLAN

West Slurry Cell and Coarse Refuse

Soil samples will be collected from each boring every ten feet as drilling progresses. The soil samples will be collected using a 5-gallon plastic pail as the cuttings are discharged from the drilling rig's cyclone. The soil sample will be divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place.

The ~~selected~~ samples from boreholes B-1 and B-2 will be sent directly to the laboratory (one composite sample per 20-feet in the refuse material, ~~one sample per five feet of the underlying soil material~~) and analyzed for the parameters listed in Appendix B. The other samples will be air dried and retained for future reference for a period of up to six months or until no longer needed. All samples taken will be examined by a qualified geologist to identify physical characteristics.

~~Samples from B-3 through B-6 will be compared with those encountered in B-1 and B-2. Samples which appear to have similar physical characteristics will be assumed to have similar chemical characteristics and will not need to be analyzed.~~

All of the samples taken from boreholes B-3 through B-6 will be retained. Efforts will be made to review the analyses from B-1 and B-2 as quickly as possible ~~and determine if any samples from B-3 through B-6 will need to be analyzed for a few specific parameters~~. After review of the physical characteristics, chemical analyses and the bore logs, consideration will be given to as to whether any analysis of specific samples from boreholes B-3 through B-6 is warranted. Additional samples from B-3 through B-6 will only be analyzed if materials are encountered which, ~~have substantially different physical characteristics and are suspected~~ because of their differing physical characteristics and/or suspected differences in chemical composition, are expected to require special reclamation considerations.

The soil samples to be analyzed will be sent under chain of custody to a Utah State or EPA Certified soils laboratory for analysis of the parameters identified in Appendix B, using the methodologies in accordance with the DOGM's guideline, Table 6.

Soil Layer Underlying The Refuse Material

Located on the southern slope of the east slurry cell is an orange-yellow layer that has cropped out in isolated spots. In an attempt to quantify the presence, areal extent, and composition of the suspected interfacial material, in-situ soil samples will be collected while drilling, if the suspected interfacial layer is encountered. Soil samples will be collected every 5-feet while drilling progresses through this layer. These samples will be analyzed as described below and in Appendix B.

The soil samples will be collected by advancing a 2-inch diameter, 24-inch long split-barrel sample tube, that contains brass liners, into the undisturbed soil beyond the bottom of the drill casing. After the drill casing reaches the proposed sampling depth, the sample tube is driven 24 inches using a 140 lb hammer that is dropped from a height of 30 inches. The collected soil sample will be divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place.

The ~~selected~~ samples of the underlying interfacial material from boreholes B-1, B-2, B-4 and B-6 will be sent directly to the laboratory (~~one sample per 20 feet in the refuse material,~~ one sample per five feet of the underlying interfacial soil material) and analyzed for the parameters listed in Appendix B. All samples not sent for analysis will be air dried and retained for future reference for a period of up to six months or until no longer needed. The soil samples will be sent under chain of custody to a Utah State or EPA Certified Soils Laboratory for chemical analysis.

At the analytical laboratory, the soil samples collected from the underlying soil layer will be prepared for analysis using the following techniques:

1) air drying the samples for 24-hours;
2) mechanically grinding the samples in order to pass through a 2-mm (10-mesh) stainless steel sieve;
3) saturate ~~mixing~~ the ground samples with deionized water with an electrical conductivity of $\leq$ 2 mmhos/cm, cover with an airtight lid, and allow to sit 24 hours to establish an equilibrium between the soil and water;
4) the liquid will then be collected for the requested analyses.

An extract, of the collected liquid, will be analyzed for the parameters outlined in Appendix B. The parameters to be analyzed and laboratory methodologies were agreed upon by DOGM at a meeting on February 2, 1994.

In addition to the analyses listed in Appendix B for the liquid extract portion, one sample for each five-foot increment from B-1, ~~and one from~~ B-2, B-4 and B-6 collected from the underlying layer will be analyzed for total arsenic, total cadmium, total chromium, and total selenium.

According to Mr. Don Verbica of the State of Utah-Division of Solid and Hazardous (DSHW), to estimate if a known (total) concentration of a metal might be near its respective TCLP-MCL, a factor of 20 times the TCLP-MCL for water may be used as an upper (total) MCL. If the total concentration for a collected soil sample exceeds 20 times the TCLP-MCL for water, for the metal in question, then a TCLP analysis will be performed on the sample which had a high metals concentration.

POSSIBLE MONITOR WELL CONSTRUCTION - Borehole B-6

Two alternatives are proposed for construction of a monitoring well in Borehole B-6; the design utilized will be based on the subsurface conditions at the time of drilling. If a perched water bearing zone of sufficient thickness is encountered on the surface of the Mancos Shale, a groundwater monitor well will be constructed as shown on Figure 3. If a perched water bearing zone of sufficient thickness is not encountered, the groundwater monitor well will be constructed as shown on Figure 4. The design shown on Figure 4 will permit water, that may be flowing on top of the Mancos Shale, to collect in the bottom of the casing, so a water sample can be collected for analysis. If insufficient water is encountered in B-6 to ensure the success of a monitoring well installation, no well will be constructed.

The monitor well is designed to be constructed with 2-inch diameter threaded, factory perforated and blank, schedule-40 PVC pipe. The screened interval is above the upper surface of the Mancos Shale. The precise length of the screened portion is dependent on the thickness of the water bearing zone encountered. The screened portion of the monitor well will consist of at least 2.5 feet of 0.010-inch slot, that is wrapped by a knitted polyester filter sock, designed to help prevent coal fines in the subsurface from entering the well screen. A threaded PVC cap is fastened to the bottom of the casing, solvents or cements are not used. The well casing is thoroughly washed and steam-cleaned prior to installation.

After setting the casing inside the bore hole, #30 silica sand is tremied or poured into the annular space from the bottom of the boring to 2 feet above the perforated interval. A 5 foot thick bentonite plug is placed above the filter material to prevent grout from infiltrating into the filter material. A type I/II portland cement mixture with 5% bentonite is tremied into the annular space from the top of the bentonite plug to the ground surface. A steel stove pipe is set over the wellhead and cemented into place.

Upon completion of the new monitor well, the top-of-casing (TOC) will be surveyed to mean-sea-level (MSL), relative to a known elevation benchmark. The monitor well will be developed by the drilling contractor using a submersible pump and/or airlift techniques until relatively clear, sand/silt free water is produced.

Monitor well sampling

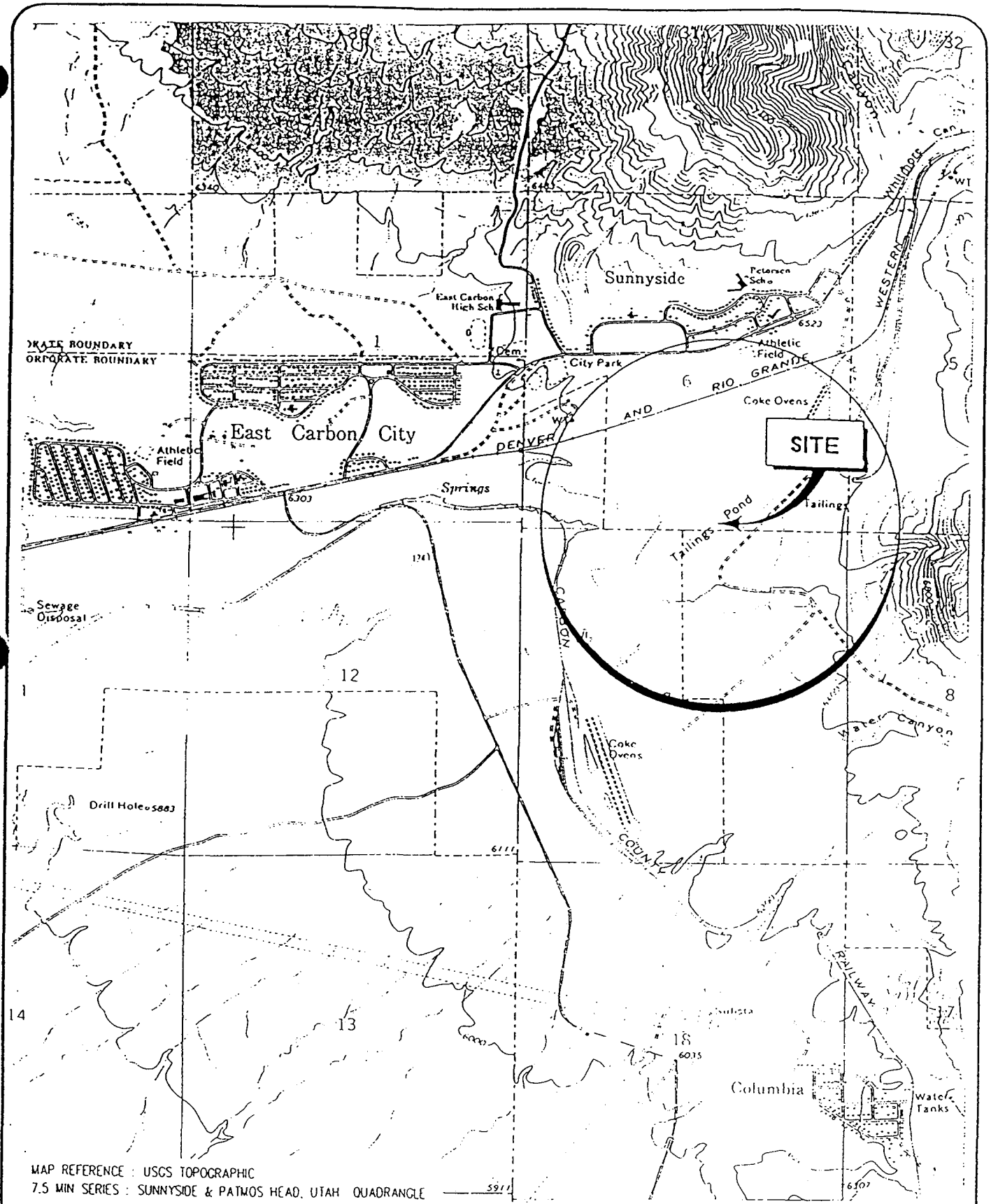
If adequate water is encountered, a representative water sample will be collected from the newly installed monitor well. A SOP for groundwater monitoring is presented in Appendix A. During purging and sampling of the monitor well, pH, temperature, specific conductivity, and dissolved oxygen will be measured and recorded. The collected water sample will be shipped under chain-of custody to a Utah State or EPA certified laboratory for analysis. The water sample will be analyzed for the parameters outlined in Appendix B using the appropriate EPA method.

If adequate water is encountered while drilling boreholes B-1 through B-5, a water sample will be collected and analyzed as listed in Appendix B. However, because of mining operations anticipated in the area, monitoring wells will not be constructed in any of the boreholes B-1 through B-5.

TECHNICAL REPORT

Following completion of the proposed work, a technical report will be prepared, for inclusion in the PAP, and will include an analysis of the data, logs of soil boring, analytical results, findings, discussion and summary. The PAP will be revised, if needed, to include a discussion of the potential for, and mitigation of, water quality impacts and/or revegetation problems attendant to re-excavation and disposal of the coal refuse material in the excess spoil area.

FIGURES

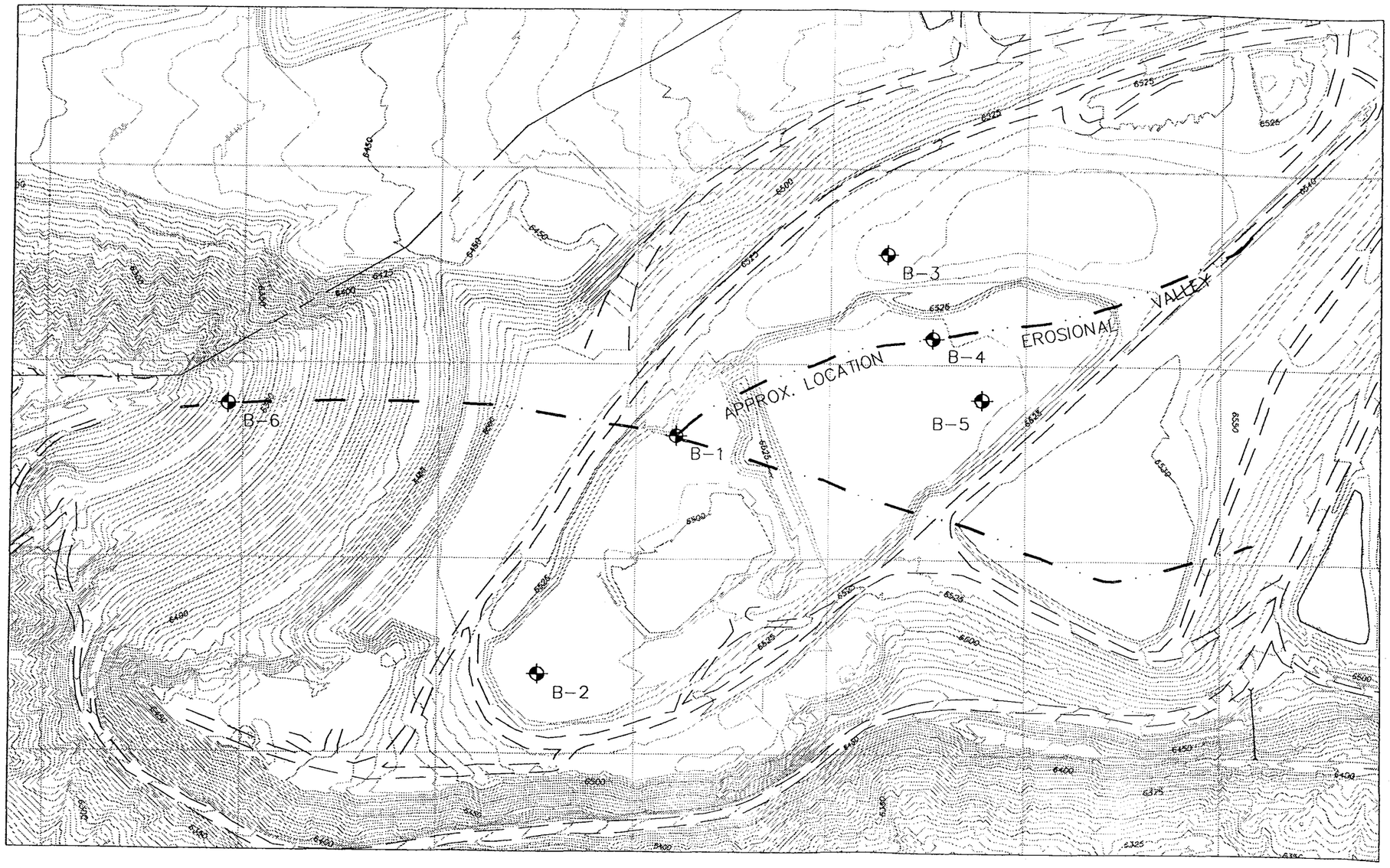


MAP REFERENCE : USGS TOPOGRAPHIC
7.5 MIN SERIES : SUNNYSIDE & PATMOS HEAD, UTAH QUADRANGLE

ECKHOFF WATSON AND PREATOR ENGINEERING
ENGINEERS PLANNERS SURVEYORS

FIGURE 1

SITE LOCATION MAP
SUNNYSIDE COGENERATION FACILITY
CARBON, COUNTY, UTAH



GRAPHIC SCALE

300 0 150 300 600

(IN FEET)
1 inch = 300ft.

LEGEND

- PERMIT BOUNDARY
- EROSIONAL VALLEY
- ROAD
- B-1 PROPOSED BORING LOCATION

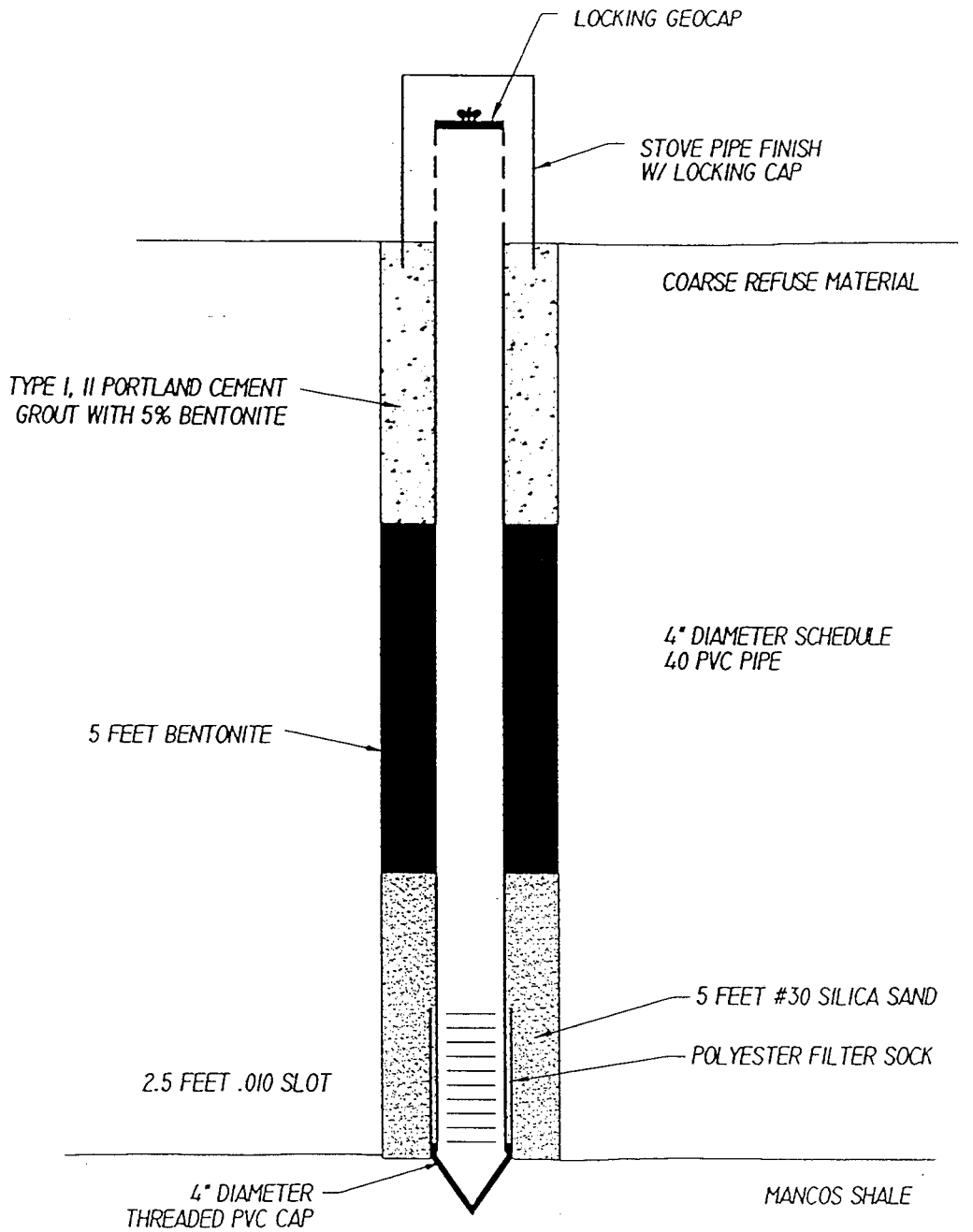
No.	Revision	By	Date
1	REV BORING LOCATIONS	AH	3/95

Project Number EC450593
Designed By AEB
Drawn By AH
Checked By AEB Date 2/94

ECKHOFF WATSON AND PREATOR ENGINEERING
ENGINEERS PLANNERS SURVEYORS SALT LAKE CITY

SUNNYSIDE COGENERATION ASSOCIATES
SUNNYSIDE COGENERATION FACILITY, CARBON COUNTY, UTAH
PROPOSED BORING LOCATIONS

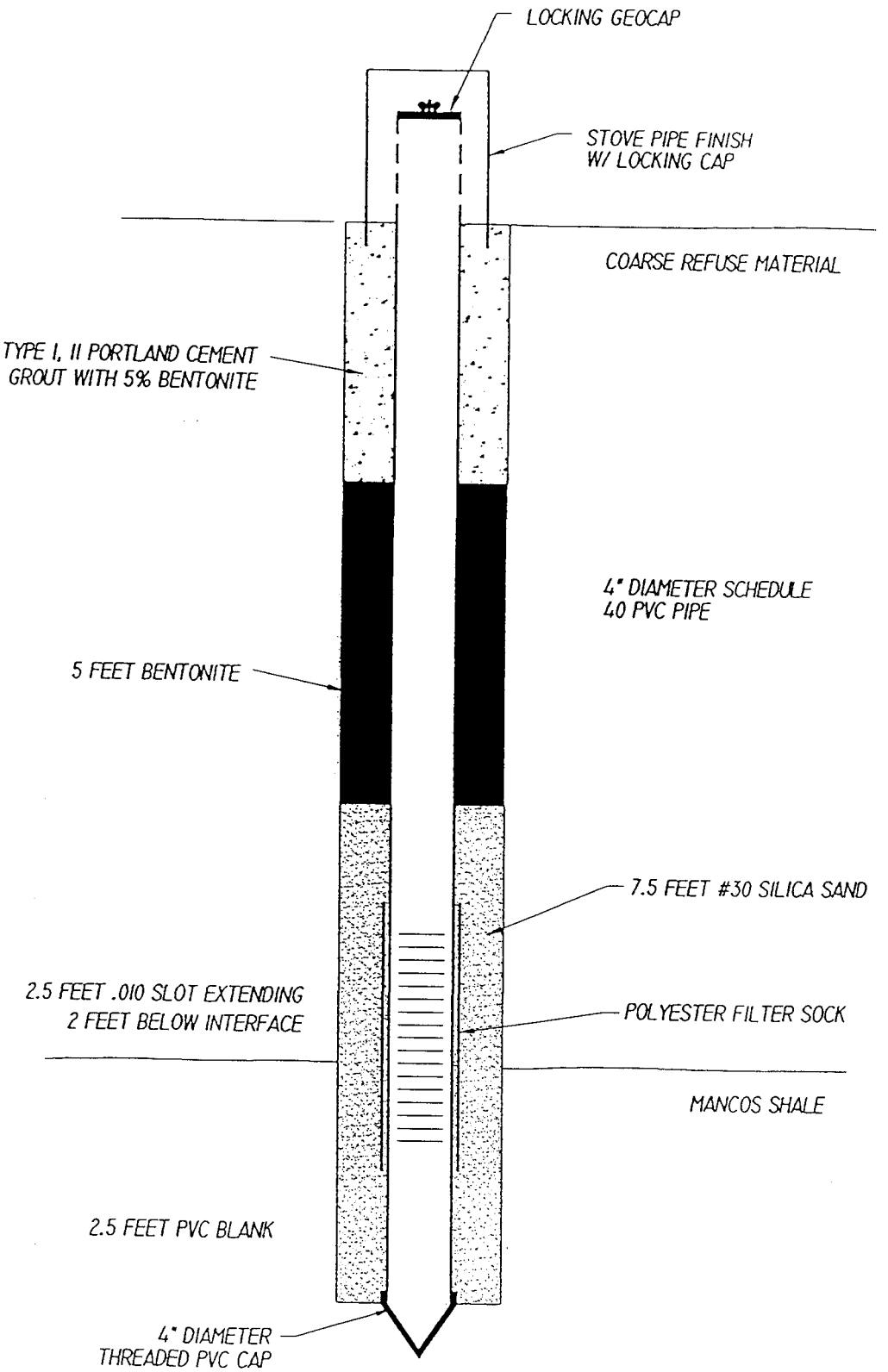
2



ECKHOFF WATSON AND PREATOR ENGINEERING
ENVIRONMENTAL SCIENCES DIVISION

FIGURE 3

SCHEMATIC #1 OF WELL CONSTRUCTION
SUNNYSIDE COGENERATION FACILITY
SUNNYSIDE, UTAH



ECKHOFF WATSON AND PREATOR ENGINEERING
ENVIRONMENTAL SCIENCES DIVISION

FIGURE 4

SCHEMATIC #2 OF WELL CONSTRUCTION
SUNNYSIDE COGENERATION FACILITY
SUNNYSIDE, UTAH

APPENDIX A
STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE

RE: PERCUSSION HAMMER - DUAL WALL REVERSE CIRCULATION DRILLING AND SOIL SAMPLING

The percussion hammer - reverse circulation rig uses a 9-7/8 inch diameter dual wall threaded casing that is driven along with the bit as drilling progresses. Each section of drill pipe is 10 feet long, and is connected to each other; this permits a continuous casing to line the bore hole which helps prevent caving and sloughing, which could result in possible cross-contamination within the bore hole. Drill cuttings are discharged through a cyclone that is mounted on the side of the drilling rig. Prior to drilling and soil sampling, all drilling and sampling equipment is steam-cleaned.

During drilling, a geologist, under supervision of a professional engineer or registered geologist, continuously logs each bore hole and collects soil samples. Each soil sample is examined and logged based on soil type, color, consistency or density of soil, moisture condition, any obvious staining, odor, and other field observations. Soil samples are collected by a State of Utah - Certified Soil and Groundwater Sampler.

In-situ soil samples are collected by advancing a split-spoon sampler that contains brass liners into the undisturbed soil beyond the tip of the casing. After the bit and casing reaches the proposed sampling depth, the sampling tube is driven 18 or 24 inches, depending on the length of the sampler, using a 140 lb hammer dropped from a height of 30 inches. The collected soil sample is divided into two parts and transferred from the brass liners to 1-gallon plastic zip-lock bag, sealed shut with the excess air expelled, properly labeled, and stored in a cool dry place. One part of the sample will be delivered or shipped under chain-of-custody to the analytical laboratory for chemical analysis, the other part of the sample will be retained for future reference.

Composite grab soil samples are collected using a clean 5-gallon plastic pail as the cuttings are discharged from the drilling rig's cyclone. The composite grab soil samples are divided into two parts; each part will be placed in a 1-gallon zip-lock bag, sealed shut with the excess air expelled, properly labeled, and placed in a cool dry place. One part of the sample will be delivered or shipped under chain-of-custody to the analytical laboratory for chemical analysis, the other part of the sample will be retained for future reference.

After collection of each soil sample, the sampling equipment is cleaned with a non-phosphatic detergent solution, and rinsed with clean water. Between each successive soil boring, all drilling and sampling equipment is steam-cleaned to help prevent cross-contamination.

STANDARD OPERATING PROCEDURE

RE: GROUNDWATER SAMPLING PROCEDURES

Upon arrival at a site, all sampling equipment is decontaminated by steam cleaning. Each well to be sampled is checked for the presence of free product using a clear bailer. SWL and TD measurements for the wells to be sampled are used to determine a calculated three-casing purge volume. Water is purged from 4-inch diameter wells using a submersible pump. 2-inch diameter wells are purged using a submersible pump or by hand bailing. Several rounds of water temperature, pH, and electric conductance measurements are often made in the course of purging. Equipment is removed from the well after the calculated purge volume is obtained or the well is pumped dry. Once sufficient recharge of the well has occurred, a sample is collected from the well using a stainless steel or disposable bailer. The water sample is retained in an appropriate container with preservative added, labeled appropriately, and stored on ice. The samples are then transported to a Utah State or EPA certified laboratory for analysis with complete chain-of-custody documentation. Sampling equipment is steam cleaned between wells and all contaminated purge water is contained in a 55-gallon drum(s).

APPENDIX B
LABORATORY ANALYSIS

Laboratory Analysis - West Slurry Cell and Coarse Refuse Material

PARAMETER	SUGGESTED METHODS
• pH	ASA Mono. No. 9, Part 2, (2 ed), 1982. Method 10-3.2, page 171. Perform pH on saturated paste.
• Electrical Conductivity	ASA Mono. Nop. 9, Part 2 (2 ed), 1982. Method 10-3.3, pages 172-173
• Saturation Percentage	SP=100 (total wt of water)/(wt of oven-dry soil).
• Particle Size Analysis (% sand, silt, clay)	Hydrometer method. Black et al. 1965. Methods of soil analysis. ASA Mono No. 9, Part 1, method 43-5, pgs 562-566
• Soluble Ca, Mg, and Na	ASA Mono. No. 9, Part 2, (2ed), 1982, Method 10-3.4. pages 173-174.
• Sodium Adsorption Ration	$[Na^+]/([Ca^{2+} + Mg^{2+}]/2)^{0.5}$
• Selenium	Extraction by ASA Mono. No.9, Part 2 (1 ed), 1965. Method 80-3.2, page 1122. Analyze by hydride generation for AA or ICP. ASA Mono. No. 9, Part 2 (2ed), 1982. Method 3-5.5, pages 59-61.
• Total N	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 31-3, pages 610-616.
• Nitrate-N	ASA Mono. No. 9, Part 2 (2 ed), 1982. Methods 33-4.1, pages 643-645; 33-8.3, pages 679-682 or Sims J.R., and G.D. Jackson. 1977. Soil Sci. Soc. Am. Proc. 35:603-607.
• Boron	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 25-9.1, page 443 for extraction and Method 25-5, pages 443-446 for analysis.
• Maximum Acid Potential*	US EPA. 1978. EPA 600/2-78-054. Method 3.2.6, page 60.

Laboratory Analysis - West Slurry Cell and Coarse Refuse (Continued)

PARAMETER	SUGGESTED METHODS
• Neutralization Potential	US EPA. 1978. EPA 600/2-28-054. Method 3.2.3, page 47.
• Organic Carbon	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 29-3.5.3, pages 571-573.
• Exchangeable Sodium**	ASA Mono. No. 9, Part 2 (2 ed), 1982. Method 13-4.4, pages 238-241. Using Flame Emission and using extractatea in method 8-3, page 152.
• Available Water Capacity	USDA SCS Soil Survey Investigation report No. 1, Method 4c1, Page 24.
• Rock Fragments	USDA SCS Soil Survey Investigation report No. 1, Method 3B, Page 18.

* Percent sulfate-sulfur, percent pyritic-sulfur, and % total-sulfur will be determined in reference to the acid potential analysis.

** If the samples have a SAR greater than 12 for clay textured soils or greater than 15 for sandy textured soils, then exchangeable sodium % should be analyzed.

Laboratory Analyses - Suspected Contaminated Layer Underlying The Refuse Material

PARAMETER

1) VIA ATOMIC ABSORPTION

Selenium	Arsenic	Chromium	Nickel
Copper	Cadmium	Zinc	Lead
Molybdenum			

2) VIA ICP SPECTROMETRY

Aluminum	Iron	Cobalt	Manganese
Boron			

3) Alkalinity (CO_3^{2-}, HCO_3^{2-})
4) Exchangeable acidity
5) Chloride
6) Nitrate
7) Sulfate

Monitor Well - Water Sample Analysis

HCO_3^{2-}	CO_3^{2-}	Acidity	Hardness
Oil and Grease	BOD-5 day	TSS	TDS
Ammonia Nitrogen	Nitrite Nitrogen	Total Phenolics	Sulfate
Total Cyanide			

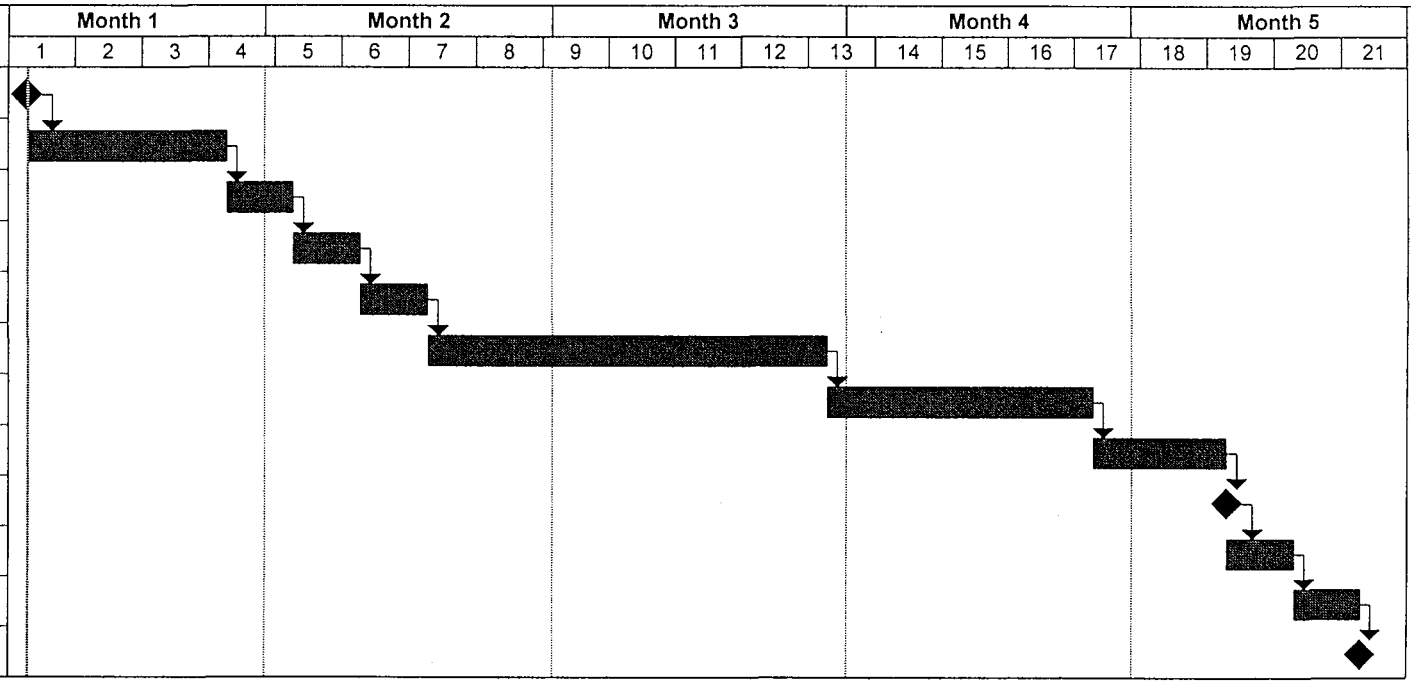
Total and Dissolved Metals

Arsenic	Cadmium	Copper	Lead
Mercury	Selenium	Molybdenum	Potassium
Sodium	Nickel	Aluminum	Boron
Iron	Calcium	Magnesium	Manganese

APPENDIX C
PROPOSED SCHEDULE

SUNNYSIDE COGENERATION ASSOCIATES
SCHEDULE
DRILLING, SAMPLING AND ANALYSIS OF ACID/TOXIC FORMING DATA

ID	Task Name
1	DOGM Review and Acceptance of Plan
2	Obtain Bids from Drillers & Labs
3	Select Drilling Contractor & Lab
4	Mobilization
5	Drilling
6	Testing
7	Analysis
8	Reporting
9	Draft Report to SCA for Review
10	SCA Review
11	Final Report
12	Submit to DOGM



State of Utah
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt
Governor
Ted Stewart
Executive Director
James W. Carter
Division Director

355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84180-1203
801-538-5340
801-359-3940 (Fax)
801-538-5319 (TDD)

April 28, 1995

Mr. David Pearce
Sunnyside Cogeneration Associates
P.O. Box 58087
Salt Lake City, Utah 84158-0087

Re: Refuse Pile Drilling - Approved, Sunnyside Cogeneration Associates, Sunnyside Refuse & Slurry, ACT/007/035-95C, Folder #3, Carbon County, Utah

Dear Mr. Pearce:

The drilling program for the refuse pile submitted April 12, 1995 has been reviewed and is approved. Please submit seven finalized copies of this proposal to the Division by May 31, 1995.

Sincerely,

Pamela Grubaugh-Littig
Permit Coordinator

cc: Daron Haddock
Joe Helfrich

SUNNYSIDE COGENERATION ASSOCIATES
PO BOX 10
EAST CARBON, UTAH 84539

95C

March 8, 1995

RECEIVED
MAR - 8 1995
DIV OF OIL, GAS & MINING

Ms. Pam Grubaugh-Littig
Division of Oil, Gas and Mining
3 Triad Center - Suite 350
Salt Lake City, UT 84180-1203

RE: Permit No. ACT / 007 / 035 : Sunnyside Cogeneration Associates
Permit Submittal NOV N93-13-2-1, Permit Condition #18
Engineer's Project No. EC450593

Copy for Daron, Henry, Tom

Dear Daron,

This submittal includes a plan for characterization of the Refuse Pile/West Slurry Cell to meet requirements of NOV N93-13-2-1, and Permit Condition #18.

If you have any questions concerning this submittal, please feel free to call the SCA Plant Manager, Glen Kaas, at (801) 888-4476, or Alane Boyd at (801) 261-0090.

Sincerely,

AEB for Glen Kaas
Glen Kaas, SCA Plant Manager

Alane E. Boyd
Alane E. Boyd, PE
Senior Engineer- EWP

cc: Bob Evans, NRG
Tom Eckstein, B&W
Brian Burnett, CNM
Bill Malencik, DOGM
Joe Helfrich, DOGM (letter)

Attachments

AEB:ssc
c:\aascott\sca\dogmchan.ge\submit13.wpd

B&W SUNNYSIDE L.P.

B&W Sunnyside, Inc.
Managing General Partner

20 S. Van Buren Avenue
P.O. Box 351
Barberton, OH 44203-0351
(216) 753-4511
Fax (216) 860-1868

February 28, 1995

Department of Environmental Quality
Division of Water Quality
288 North 1460 West
PO Box 144870
Salt Lake City, Utah 84114-4870

Attention: Dr. Donald A. Hilden, Manager
Permits and Compliance Section

Subject: Signatory Requirements
UPDES DMR Form Compliance Reporting
UPDES Permit No. UT0024759
Sunnyside Cogeneration Associates Power Plant
Sunnyside, Utah

Dear Dr. Hilden:

Sunnyside Cogeneration Associates (SCA), hereby designates the Plant Manager or Acting Plant Manager of SCA's power plant in Sunnyside, Utah to act as authorized signator for the Discharge Monitoring Report forms submitted on behalf of SCA to the Division of Water Quality.

Sincerely,

SUNNYSIDE COGENERATION ASSOCIATES
By B&W Sunnyside L.P.
General Partner

By B&W Sunnyside, Inc.
Managing General Partner

Robert E. Wascher
Vice President

CC: D. E. Burnham
R. S. Evans
R. J. Will
Plant Manager, SCA Power Plant

REW4486/mf

APPLICATION FOR PERMIT CHANGE

Title of Change: SUNNYSIDE COGENERATION ASSOCIATES
Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18
Plan for Characterization of the Refuse Pile/West Slurry Cell

Permit Number: ACT/007/035

Mine: Sunnyside Cogen. Assoc.

Permittee: Sunnyside Cogen. Assoc.

Description - include reason for change and timing required to implement: Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18; Plan for Characterization of the Refuse Pile/West Slurry Cell

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☐ Yes	☒ No	23. Is this permit change coal exploration activity ☐ inside ☐ outside of the permit area? N/A

☒ **Attached 3 complete copies of proposed permit change as it would be incorporated into the Mining and Reclamation Plan.**

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all aspects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Signed - Name - Position - Date: Adam E. Boyd, P.E. 3/8/95

Subscribed and sworn to before me this 8th day of March, 19 95

Notary Public

My Commission Expires: March 27, 1997

Attest: STATE OF Utah
COUNTY OF Salt Lake

LINDA ERCANBRACK
Notary Public
STATE OF UTAH
My Comm. Expires MAR 27, 1997
1121 E 3900 S C-100 SLC UT 84124

RECEIVED
MAR - 8 1995
DIV OF OIL, GAS & MINING

ASSIGNED PERMIT CHANGE NUMBER

Application for Permit Change
Detailed Schedule of Changes to the Permit

Title of Change: SUNNYSIDE COGENERATION ASSOCIATES
Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18
Plan for Characterization of the Refuse Pile/West Slurry Cell

Permit Number: ACT/007/035

Mine: Sunnyside Cogen. Assoc.

Permittee: Sunnyside Cogen. Assoc.

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit change. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages or other information as needed to specifically locate, identify and revise the exiting mining and reclamation plan. **Include page, section and drawing numbers as part of the description.**

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Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?

SUNNYSIDE COGENERATION ASSOCIATES
PO BOX 10
EAST CARBON, UTAH 84539

95C

March 8, 1995

Ms. Pam Grubaugh-Littig
Division of Oil, Gas and Mining
3 Triad Center - Suite 350
Salt Lake City, UT 84180-1203

RE: Permit No. ACT / 007 / 035 : Sunnyside Cogeneration Associates
Permit Submittal NOV N93-13-2-1, Permit Condition #18
Engineer's Project No. EC450593

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Sincerely,

AEB for Glen Kaas
Glen Kaas, SCA Plant Manager

Alane E. Boyd
Alane E. Boyd, PE
Senior Engineer- EWP

cc: Bob Evans, NRG
Tom Eckstein, B&W
Brian Burnett, CNM
Bill Malencik, DOGM
Joe Helfrich, DOGM (letter)

Attachments

AEB:ssc
c:\aascott\sca\dogmchan.ge\submit13.wpd

B&W SUNNYSIDE L.P.

B&W Sunnyside, Inc.
Managing General Partner

20 S. Van Buren Avenue
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Fax (216) 860-1868

February 28, 1995

Department of Environmental Quality
Division of Water Quality
288 North 1460 West
PO Box 144870
Salt Lake City, Utah 84114-4870

Attention: Dr. Donald A. Hilden, Manager
Permits and Compliance Section

Subject: Signatory Requirements
UPDES DMR Form Compliance Reporting
UPDES Permit No. UT0024759
Sunnyside Cogeneration Associates Power Plant
Sunnyside, Utah

Dear Dr. Hilden:

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By B&W Sunnyside L.P.
General Partner

By B&W Sunnyside, Inc.
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Robert E. Wascher
Vice President

CC: D. E. Burnham
R. S. Evans
R. J. Will
Plant Manager, SCA Power Plant

REW4486/mf

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Permittee: Sunnyside Cogen. Assoc.

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Alane E. Boyd, P.E. 3/8/95
Signed - Name - Position - Date

Subscribed and sworn to before me this 8th day of March, 19 95

Notary Public

LINDA ERCANBRACK
Notary Public
STATE OF UTAH
My Comm. Expires MAR 27, 1998
1121 E 3900 S C-100 SLC UT 84124

My Commission Expires: March 27, 1998
Attest: STATE OF Utah
COUNTY OF Salt Lake

RECEIVED
Received by Oil, Gas & Mining
MAR - 8 1995
DIV OF OIL, GAS & MINING

ASSIGNED PERMIT CHANGE NUMBER

Application for Permit Change
Detailed Schedule of Changes to the Permit

Title of Change: SUNNYSIDE COGENERATION ASSOCIATES
Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18
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Permit Number: ACT/007/035

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Permittee: Sunnyside Cogen. Assoc.

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EAST CARBON, UTAH 84539

95Q

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Division of Oil, Gas and Mining
3 Triad Center - Suite 350
Salt Lake City, UT 84180-1203

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Glen Kaas, SCA Plant Manager

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Attachments

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Sunnyside, Utah

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General Partner

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Robert E. Waschler
Vice President

CC: D. E. Burnham
R. S. Evans
R. J. Will
Plant Manager, SCA Power Plant

REW4486/mrf

APPLICATION FOR PERMIT CHANGE

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☐ Yes	☒ No	23. Is this permit change coal exploration activity ☐ inside ☐ outside of the permit area? N/A

☒ **Attached 3 complete copies of proposed permit change as it would be incorporated into the Mining and Reclamation Plan.**

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all aspects with the laws of Utah in reference to commitments, undertakings, and obligations, herein.

Signed - Name - Position - Date: Alane E. Boyd, P.E. 3/8/95

Subscribed and sworn to before me this 8th day of March, 19 95

Notary Public

My Commission Expires: March 27, 1997

Attest: STATE OF Utah
COUNTY OF Salt Lake

LINDA ERCANBRACK
Notary Public
STATE OF UTAH
My Comm. Expires MAR 27,1997
1121 E 3900 S C-100 SLC UT 84124

Received by Oil, Gas & Mining

MAR - 8 1995

DIV OF OIL, GAS & MINING

ASSIGNED PERMIT CHANGE NUMBER

Application for Permit Change
Detailed Schedule of Changes to the Permit

Title of Change: SUNNYSIDE COGENERATION ASSOCIATES Permit submittal associated with **NOV N93-13-2-1** and Permit Condition 18 Plan for Characterization of the Refuse Pile/West Slurry Cell	Permit Number: ACT/007/035 Mine: Sunnyside Cogen. Assoc. Permittee: Sunnyside Cogen. Assoc.

Provide a detailed listing of all changes to the mining and reclamation plan which will be required as a result of this proposed permit change. Individually list all maps and drawings which are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages or other information as needed to specifically locate, identify and revise the exiting mining and reclamation plan. **Include page, section and drawing numbers as part of the description.**

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	☒ REPLACE	☐ REMOVE	PAP APPENDIX 6-5 Drilling and Sample Collection
☐ ADD	☐ REPLACE	☐ REMOVE	
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Any other specific or special instructions required for insertion of this proposal into the Mining and Reclamation Plan?