

**Alton Coal Development, LLC**

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*C/025/005 Incoming*

*#4396*

*OK*

August 12, 2013

Daron R. Haddock  
Coal Program Manager  
Oil, Gas & Mining  
1594 West North Temple, Suite 1210  
Salt Lake City, UT 84114-5801

Subject: **Revised Diversion Ditch 1 and Sediment Impoundment 4, Task #4369, Coal Hollow Project, Kane County, Utah, C/025/0005**

Dear Mr. Haddock,

Alton Coal Development, LLC is providing this submittal to make minor revisions to Diversion Ditch 1(DD1) and Pond 4. Revisions have been made as per the deficiency list in task #4292 and 4369.

Please find enclosed 2 (two) redline copies of the text changes and 2 (two) clean copies of the revised text and drawings for review and insertion into the MRP. Please do not hesitate to contact me if you have any questions.

Sincerely

B. Kirk Nicholes  
Environmental Specialist

**RECEIVED**

**AUG 15 2013**

**DIV. OF OIL, GAS & MINING**

**R645.301.742.331** Chapter 7 Section 742.331 states ‘Diversion ditch 4 is planned to direct water from disturbed areas into sediment impoundment Pond 4’, this statement is inconsistent with the MRP and needs to be corrected. [KMH]

The text in Chapter 7 Section 742.331 has been corrected to identify Pond 3 as the termination of Diversion Ditch 4.

**R645.301.742.331** Inconsistencies exist in the MRP Appendix 5-2 as follows:  
--Page 2 Watershed Table: Watershed 4 remains 256 acres. The Permittee is not altering the watershed just the flow path. The text describes this table as the full watershed.

*MRP Appendix 5-2 Page 2 is a continuation of the discussion of Sediment Impoundments and the text under the “Details” section is a description of how the watershed for each Sediment Impoundment was arrived at beginning with “runoff flow paths for the entire project area” and “in combination with proposed control structures (ponds, diversion ditches, etc..).”* Therefore the acreages found in the “Watersheds” table found on page 2 are the watersheds that report to each respective Sedimentation Impoundment. This table corresponds to Drawing 5-26 Sediment Impoundment Watersheds. Changes have been made to Drawing 5-26 (to correct watershed 4 which was previously split into 4a and 4b) and Page 2 to correctly identify the information in the table.

--Page 6 Diversion Watersheds: Ditch 1 watershed acreage does not match Drawing 5-27 (160 acres verse 158 acres, respectively). In addition, it seems peculiar that the Permittee’s resulting peak flow (14.8 cfs) for Pond 4 (96 acres) and Ditch 1 watershed (160 acres) are the same. It is recommended the Permittee review their calculation. [KMH]

Drawing 5-27 has been corrected to reflect the correct acreage of 158 acres. Calculations for Ditch 1 and Pond 4 have been reevaluated, and corrections made in the Appendix 5-2

**R645.301.742.111** The amendment does not include any conveyance structures to deliver disturbed area flow to Pond 4. The amendment must be updated to demonstrate it will control disturbed area runoff and prevent it from runoff outside of the permit area. If a exclusionary berm is to be used it must be designed or if a diversion ditch will be used it must be designed. [KHM]

An engineered berm has been added to the appropriate drawings (Drawings 5-3 and 5-26) to divert runoff from upgradient disturbed areas to Pond 4. This berm is located along side of DD1 to separate the undisturbed flow from disturbed flow from within the mine boundaries.

# APPLICATION FOR COAL PERMIT PROCESSING

Permit Change  New Permit  Renewal  Exploration  Bond Release  Transfer

**Permittee:** Alton Coal Development, LLC

**Mine:** Coal Hollow

**Permit Number:** C/025/0005

**Title:** Revised Diversion Ditch Land Sediment Impoundment 4

**Description,** Include reason for application and timing required to implement:

To allow undisturbed surface runoff to bypass sediment control structure

**Instructions:** If you answer yes to any of the first eight (gray) questions, this application may require Public Notice publication.

- Yes  No 1. Change in the size of the Permit Area? Acres: \_\_\_\_\_ Disturbed Area: \_\_\_\_\_  increase  decrease.
- Yes  No 2. Is the application submitted as a result of a Division Order? DO# \_\_\_\_\_
- Yes  No 3. Does the application include operations outside a previously identified Cumulative Hydrologic Impact Area?
- Yes  No 4. Does the application include operations in hydrologic basins other than as currently approved?
- Yes  No 5. Does the application result from cancellation, reduction or increase of insurance or reclamation bond?
- Yes  No 6. Does the application require or include public notice publication?
- Yes  No 7. Does the application require or include ownership, control, right-of-entry, or compliance information?
- Yes  No 8. Is proposed activity within 100 feet of a public road or cemetery or 300 feet of an occupied dwelling?
- Yes  No 9. Is the application submitted as a result of a Violation? NOV # \_\_\_\_\_
- Yes  No 10. Is the application submitted as a result of other laws or regulations or policies?  
*Explain:* \_\_\_\_\_
- Yes  No 11. Does the application affect the surface landowner or change the post mining land use?
- Yes  No 12. Does the application require or include underground design or mine sequence and timing? (Modification of R2P2)
- Yes  No 13. Does the application require or include collection and reporting of any baseline information?
- Yes  No 14. Could the application have any effect on wildlife or vegetation outside the current disturbed area?
- Yes  No 15. Does the application require or include soil removal, storage or placement?
- Yes  No 16. Does the application require or include vegetation monitoring, removal or revegetation activities?
- Yes  No 17. Does the application require or include construction, modification, or removal of surface facilities?
- Yes  No 18. Does the application require or include water monitoring, sediment or drainage control measures?
- Yes  No 19. Does the application require or include certified designs, maps or calculation?
- Yes  No 20. Does the application require or include subsidence control or monitoring?
- Yes  No 21. Have reclamation costs for bonding been provided?
- Yes  No 22. Does the application involve a perennial stream, a stream buffer zone or discharges to a stream?
- Yes  No 23. Does the application affect permits issued by other agencies or permits issued to other entities?

**Please attach four (4) review copies of the application. If the mine is on or adjacent to Forest Service land please submit five (5) copies, thank you.** (These numbers include a copy for the Price Field Office)

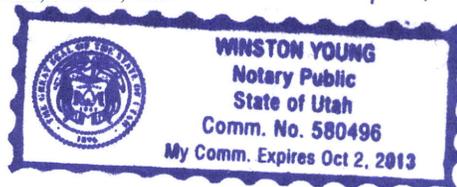
I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments, undertakings, and obligations, herein

B. Kirk Nicholas  
Print Name

B. Kirk Nicholas Env. Spec. 8/13/13  
Sign Name, Position, Date

Subscribed and sworn to before me this 13 day of August, 2013

[Signature]  
Notary Public  
My commission Expires: Utah 10/02, 2013 }  
Attest: State of Utah } ss:  
County of Iron



<b>For Office Use Only:</b>	<b>Assigned Tracking Number:</b>	<b>Received by Oil, Gas &amp; Mining</b>  <span style="font-size: 1.5em; color: red; font-weight: bold;">RECEIVED</span>  <span style="font-size: 1.2em; color: black; font-weight: bold;">AUG 15 2013</span>  <span style="color: red; font-weight: bold;">DIV. OF OIL, GAS &amp; MINING</span>
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# APPENDIX 5-2

Sediment Impoundment and  
Diversion Structure Analysis

By: Alton Coal Development, LLC  
Chris McCourt, P.E.

Revised Aug. 2013  
Dan W. Guy



# Coal Hollow Mine – Sedimentation Structure Sizing

## Introduction

Protection of surface water quality at the Coal Hollow Mine is an important part of the mining process. By utilizing sedimentation structures for diversion and sediment impoundment, Alton Coal Development, LLC (ACD) will minimize the sediment that could potentially flow from active disturbance areas into drainages that are in and surrounding the proposed project area. Appropriate sizing of these structures is a necessary step toward ensuring that these controls function properly and serve the purpose of protecting the surrounding environment.

Therefore, ACD has completed a watershed analysis for appropriate sizing of four proposed sedimentation impoundments and four diversion ditches. This report will outline the methods used and results of this analysis.

## Sediment Impoundments

### Summary

The watersheds for the four proposed sedimentation impoundments have been evaluated mainly using the TR-55 method. This method of analysis was first issued by the Soil Conservation Service (SCS) in 1975. It has since been revised and updated numerous times. This method is applicable for evaluating small watersheds.

To assist with the calculations and mapping, Carlson 2007 Hydrology software has been utilized for this evaluation. A watershed analysis for this project includes: runoff flow paths, watershed boundaries, length and average grade for longest flow lines, runoff curve number classification, time of concentration and peak discharge. Information from this analysis was then used for sedimentation structure sizing. For the specifics associated with each of these parameters refer to the details section of this report.

The sedimentation structures were sized to impound the runoff associated with a 100-year frequency, 24-hour duration storm event. Using the Carlson rainfall map (assembled using TP-40 and TP-47 data), the rainfall intensity associated with this size of event for the Alton area is 3.1 inches. The following table summarizes the final results for each sedimentation structure:

<b>Sedimentation Impoundment Capacities</b>				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent above requirement	Additional Storage (ac/ft)
1	2.6	3.1	119	0.5
2	1.7	2.3	135	0.6
3	6.3	<del>7.7</del> 10.9	<del>+15</del> 173	<del>+0.4</del> 6
4	<del>5.7</del> 3.8	<del>7.5</del> 5.5	<del>+32</del> 224	<del>+1.8</del> 1.7
1B	0.5	0.8	160	0.3

\*Design capacities include a minimum of 2 feet free board (spillway to top of embankment)

The enclosed maps and cross sections detail the design and location for each structure (Drawings 5-25 through 5-34). These drawings also show proposed spillways, diversion ditches and watersheds associated with each structure.

## Details

Determining storage capacity requirements using the TR-55 method requires several steps. This section of the report will provide the details and assumptions associated with each step. These steps are: watershed boundaries/flow paths, runoff curve number classification, time of concentration, peak discharge and structure sizing.

- **Watershed Boundaries/Flow Paths**

The watershed boundaries were determined by first identifying the runoff flow paths for the entire project area. This was completed by creating a three dimensional model of the surface topography. This model was then used to draw flow paths for all the watersheds. Based on these flow paths, boundaries for each watershed are easily determined based on flow direction in combination with proposed control structures (ponds, diversion ditches, etc..).

Using this process, the project area (in conjunction with diversion ditch locations and berms) was found to be separated into seven distinct watersheds. The natural separations of watersheds in this area are Lower Robinson Creek to the north and Sink Valley Wash at the south end. In addition to these natural separations, the proposed diversion ditches and berms also provide definite boundaries as shown on Drawings 5-26 and 5-27. The following summarizes the watersheds:

<b>Sediment Impoundment Watersheds</b>		
<b>Watershed</b>	<b>Area (acres)</b>	<b>Description</b>
1	27	North end of project area where facilities are proposed.
2	74	Borders south edge of Lower Robinson Creek.
3	285	Main watershed through the center of permit area
4	25696	Southern most watershed bordered by Sink Valley Wash
*5	28	Isolated area between watersheds 3 and 4
*6	19	Area northwest of Lower Robinson Creek Reconstruction
7	5	Southwest end of facilities area, entrance/exit road

\* These watersheds will have silt fence or other appropriate control measures installed.

- **Rainfall Amount and Runoff Curve Number Classification**

First data required to begin estimating runoff for the watersheds is the rainfall amount and the runoff curve number classification. The rainfall amount is the precipitation associated with a 100 year frequency, 24 hour duration storm event. The runoff curve number classification is a classification of the soil and vegetation cover conditions for the watersheds.

In order to estimate runoff from rainfall, the rainfall amount for a 100 year frequency, 24 hour duration storm event was determined using the Carlson

rainfall map. This map was assembled by Carlson software based on TP-40 and TP-47 data. The resulting rainfall amount for the Alton area using this map is 3.1 inches.

The runoff curve number was determined by matching the ground cover description and estimated hydrologic soil group for the project area to the descriptions available in Table 2-2d of TR-55. Based on visual observations of the project area and soils the following classifications were estimated:

1. Cover Description: The cover description that best fits watersheds 2, 3 and 4 is "Sagebrush with grass understory". The hydrologic condition for this cover was estimated at "fair" which is defined as 30% to 70% ground cover. This estimation was based off the knowledge of current conditions and future disturbance/reclamation. Plans for this operation include sequenced disturbance combined with concurrent reclamation. This will minimize the area that will be disturbed at any one time. This will be combined with a general vegetation coverage improvement within one to two growing seasons for reclamation compared to current conditions. In addition, a significant amount of runoff from the active mining area for this magnitude of storm event will be temporarily controlled within the active pit area and will not immediately report to the designed impoundments.

Watershed 1 and 7 have been classified differently since they includes the mine facilities area. This watershed is classified as "Gravel roads" since most the area will be stripped of vegetation and gravel spread for parking areas and roads. This results in a much higher runoff than the classification for the other three watersheds.

2. Hydrologic Soil Group: This classification was estimated to be Group C for the five watersheds evaluated, as outlined in Appendix A in TR-55. This classification is for soils having low infiltration rates thus producing high amounts of runoff. The soils in this classification typically have infiltration rates of 0.05 to 0.15 inches per hour.

The resulting curve number for watersheds 2, 3 and 4<sub>a</sub> is 63. Watershed 1 and 7 were assigned a curve number of 89. These classifications are intended to be conservative estimates (producing higher than expected runoff) to ensure that the sedimentation structures have more than sufficient storage capacity.

These classifications are used in the next step for determining the time of concentration.

- **Time of Concentration ( $T_c$ )**

$T_c$  is the time for runoff to travel from the furthest point in the watershed to the point that it meets the sedimentation structure. This figure is essential for calculating the peak flow which is used to determine the required size for the sedimentation structure. The SCS method for calculating  $T_c$  is used in this analysis. The following table summarizes the inputs for calculating the  $T_c$  along with the resulting outputs:

<b>Time of Concentration (<math>T_c</math>)</b>				
Watershed	Curve Number	Flow Length (ft)	Average Slope (%)	$T_c$ (hrs)
1	89	1,087	6.8	0.16
2	63	5,670	3.8	1.7
3	63	7,095	3.5	2.2
4	63	6,831 <del>3,805</del>	2.9	<del>2.3</del> 1.8
7	89	750	3.9	0.08

The  $T_c$  for each watershed is used to calculate the peak discharge which is the final step leading to the structure sizing.

- **Peak Discharge**

The peak discharge for each watershed was calculated using the Graphical method. The inputs required for this method include:  $T_c$ , drainage area, 100 year 24 hour rainfall and the runoff curve number (CN). The following table outlines these inputs and the peak discharge:

<b>Peak Discharge (*Inflow)</b>					
Watershed	CN	$T_c$ (hr)	Rainfall (in)	Drainage Area (ac)	Peak Discharge (cfs)
1	89	0.16	3.1	27	74.7
2	63	1.7	3.1	74	9.9
3	63	2.2	3.1	300	33.9
4	63	<del>2.3</del> 1.8	3.1	<del>256</del> 96	<del>27.8</del> 14.8
7	89	0.8	3.1	5	15.6

\*The peak discharge from each watershed will also be the peak inflow to the sedimentation structures.

- **Sedimentation Impoundment Sizing**

The method used for this step is again from the TR-55 program. A sedimentation structure is required for each one of the five watersheds analyzed. Therefore, a size has been evaluated for the five proposed structures. The inputs for this calculation are the following: drainage area, peak inflow, desired outflow, and runoff depth (Q). The desired outflow in this situation is zero since we do not intend any discharge from the structures. The spillways for these structures are proposed for emergency use only and are not intended for regular discharges. The following table summarizes these inputs and the required storage capacity for each watershed:

<b>Sedimentation Impoundment Sizing</b>				
Watershed	Drainage Area (ac)	Inflow (cfs)	Q (in)	Storage Required (ac/ft)
1	27	74.7	2.00	2.6
2	74	9.9	0.48	1.7
3	285	31.8	0.48	6.3
4	<del>25696</del>	<del>30414.8</del>	0.48	<del>573.8</del>
1B	5	15.6	2.00	0.5

The enclosed maps show the proposed design and locations for each one these structures.

### **Conclusions**

This analysis provides estimates of sufficient storage capacities for each watershed to impound water from a 100 year frequency, 24 hour duration storm event at the proposed Coal Hollow Mine. In addition to the required storage capacities, a minimum 15% additional storage capacity has been added to each structure design to account for sediment and any standing water that may occur. Spillways have also been included in the structure designs to provide a non destructive route for discharge should these capacities ever be exceeded.

Due to the isolated characteristics and the inability to effectively divert water from Watershed 5 and 6, the method of using silt fence or other appropriate control measures for sediment have been chosen and is included on the Drawing 5-26.

The structure designs established from this analysis will minimize impacts from sediment to the surrounding environment at the Coal Hollow Mine.

## **Diversion Ditches**

### **Summary**

The channel sizing for the four proposed diversion ditches has been evaluated using the TR-55 method to determine peak flows and the Manning's Equation (ME) to determine appropriate dimensions. The TR-55 method of analysis is the same method used to size impoundments and was utilized in this case to provide a peak flow for each diversion during a 100 year, 24 hour storm event. This peak flow was then input into the ME to determine an appropriate open channel design for minimizing the effects of erosion during peak flows. Similar to the impoundment sizing, the Carlson Software Hydrology module was utilized to perform these calculations. The ditch locations, designs and cross sections can be viewed on Drawings 5-33 and 5-34.

The following table summarizes the inputs and results for each diversion based on flows during a 100 year, 24 hour storm event:

Diversion Ditch Summary							
Ditch	*Base (ft)	Manning's n	Average Slope (%)	Peak Flow (cfs)	Flow Depth (ft)	Velocity (fps)	Freeboard (ft)
1	3.0	0.020	2.8	<del>14.8</del> 17.4	<del>0.5</del> 0.6	<del>6.8</del> 7.2	0.3
2	2.5	0.020	3.5	6.9	0.4	6.0	0.3
3	4.5	0.020	2.4	16.7	0.5	6.3	0.3
4	5.0	0.020	1.1	19.8	0.6	5.4	0.3

\*All side slopes are 2h:1v

## Details

- **Watersheds**

The first step used for evaluating the diversions was to determine the peak flow during a 100 year, 24 hour storm event for each diversion. In order to determine this variable, the TR-55 method of watershed analysis was again utilized. This requires determining the watershed boundaries associated with each diversion. The following table summarizes these watersheds:

Diversion Watersheds		
Ditch	Area (acres)	Description
1	158	Diverts water <del>outside project area into Pond 4</del> <u>around project area</u>
2	48	Diverts water along Robinson Creek to Pond 2
3	72	Diverts water around facilities area
4	169	Diverts water from project area into Pond 3

- **Rainfall Amount and Runoff Curve Number Classification**

The rainfall amount for a 100 year, 24 hour storm event was developed utilizing the same method as previously discussed in the impoundments section of this report. This number is 3.1 inches of precipitation.

The runoff curve number classification for all four watersheds was estimated to be 63. This classification is consistent with the classification and logic used for the impoundment analysis.

- **Time of Concentration ( $T_c$ )**

$T_c$  is the time for runoff to travel from the furthest point in the watershed to the point that it meets the sedimentation structure. This figure is essential for calculating the peak flow which is used to determine the required size for the diversion ditch. The SCS method for calculating  $T_c$  is used in this analysis. The following table summarizes the inputs for calculating the  $T_c$  along with the resulting outputs:

Time of Concentration (T <sub>c</sub> )				
Ditch	Curve Number	Flow Length (ft)	Average Slope (%)	T <sub>c</sub> (hrs)
1	63	8,487	2.9	2.9
2	63	4,187	3.6	1.4
3	63	3,742	13.7	0.7
4	63	5,868	3.9	1.8

The T<sub>c</sub> for each watershed is used to calculate the peak flow which is the final step leading to the diversion dimensions.

- Peak Flow**

The peak flow for each diversion was calculated using the Graphical method. The inputs required for this method include: T<sub>c</sub>, drainage area, 100 year 24 hour rainfall and the runoff curve number (CN). The following table outlines these inputs and the peak flow:

Diversion Peak Flow					
Ditch	CN	T <sub>c</sub> (hr)	Rainfall (in)	Drainage Area (ac)	Peak Flow (cfs)
1	63	2.9	3.1	158	<del>14.8</del> 17.4
2	63	1.4	3.1	48	6.9
3	63	0.7	3.1	72	16.7
4	63	1.8	3.1	169	19.8

- Diversion Dimensions**

The Manning's Equation (ME) equation was used to appropriately size the each diversion. Inputs into this equation are manning's coefficient, average diversion slope, peak flow and side slope angles. Outputs are the depth of flow, and base dimension for a trapezoidal channel design. The following table summarizes the inputs and results:

Diversion Ditch Summary							
Ditch	**Base (ft)	*Manning n	Average Slope (%)	Peak Flow (cfs)	Flow Depth (ft)	Velocity (fps)	Freeboard (ft)
1	3.0	0.020	2.8	<del>14.8</del> 17.4	<del>0.5</del> 0.6	<del>6.8</del> 7.2	0.3
2	2.5	0.020	3.5	6.9	0.4	6.0	0.3
3	4.5	0.020	2.4	16.7	0.5	6.3	0.3
4	5.0	0.020	1.1	20.6	0.6	5.0	0.3

\*Manning n of 0.020 is for ordinary firm loam

\*\*All side slopes are 2h:1v

## Conclusions

These diversions have been sized in manner that will transport the necessary flows and minimize erosion during a 100 year, 24 hour storm event. These diversions will prevent

runoff from up gradient watersheds from entering the active mining areas and will also assist in directing water from disturbed areas to the sediment impoundments.

pipes, ditches, or other conveyance methods, minimizing the need for the pumping of mine discharge waters to the sediment ponds. Groundwater that interacts with the Tropic Shale and the Smirl coal seam in the mine pits is considered as mine water and accordingly it will be either routed to Pond #3 or Pond #4 and subsequently discharged under the approved Coal Hollow Mine UPDES discharge permit, or it will be contained and managed within the pit areas and not discharged.

Depending on prevailing climatic conditions and on the nature and quantity of encountered mine waters, at times it may periodically be necessary to discharge water from the Coal Hollow Mine sediment ponds. The discharges from the ponds will occur in compliance with the approved Coal Hollow Mine UPDES permit (see Appendix 7-12).

Five impoundments are proposed to control storm water runoff and sediment from disturbed areas. Each impoundment is designed to contain the run off from a 100 year, 24 hour duration storm event or more. The locations of the impoundments and the associated watersheds can be viewed on Drawing 5-26. The following table summarizes the final capacity results for each impoundment:

<b>Sedimentation Impoundment Capacities</b>				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent of requirement	Additional Storage (ac/ft)
1	2.6	3.1	119	0.5
2	1.7	2.3	135	0.6
3	6.3	10.9	173	4.6
4	<del>5.7</del> <u>2.1</u>	<del>7.5</del> <u>5.5</u>	<del>132</del> <u>261</u>	<del>1.8</del> <u>3.4</u>
1B	0.5	0.8	160	0.3

Structure 1 is a rectangular impoundment approximately 136 feet long by 81 feet wide and 9 feet in depth. This impoundment will control storm water run off from the facilities area. The impoundment will be constructed with a 24" drop pipe spillway in order to prevent any oil sheens that may occur from discharging. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 3 feet freeboard. This pond will control storm water from a watershed of approximately 27 acres. The cleanout and spillway elevation are 6911' and 6920', respectively. The top of the embankment is at elevation 6924'. Details for the design can be viewed on Drawing 5-28.

Structure 1B is a small rectangular impoundment that is approximately 40 feet long by 20 feet wide. This impoundment will control storm water run off from the facilities access road system. The impoundment will be constructed with a 24" drop pipe spillway in order to prevent any oil sheens that may occur from discharging. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 5 acres. The cleanout and spillway elevation are 6894' and 6906', respectively. The top of

the embankment is at elevation 6908'. Details for the design can be viewed on Drawing 5-28B.

Structure 2 is a rectangular impoundment approximately 188 feet long by 36 feet wide and 9 feet in depth. This impoundment will control storm water runoff from the disturbed areas immediately south of Lower Robinson Creek. The impoundment will be constructed with a 24" drop pipe spillway. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum 3 feet freeboard. This pond will control storm water runoff from a watershed of approximately 74 acres. The cleanout and spillway elevation are 6891' and 6900', respectively. Top of the embankment is at elevation 6903'. Details for the design can be viewed on Drawing 5-29.

Structure 3 is a valley fill impoundment that will impound an area approximately 484 feet long by 229 feet wide and 9 feet deep. The fill for the impoundment will be constructed from an excavation 198 feet wide by 229 feet long and 8 feet deep. The embankment will be constructed in 2 foot lifts utilizing a dozer. The top of the embankment will be a minimum 12 feet wide. The spillway will be an open channel that will have ~~vegetated slopes~~ rip-rap min. 6". This pond will control storm water runoff from a watershed of approximately 300 acres. The cleanout and spillway elevation are 6802' and 6811', respectively. Top of the embankment is at 6813'. Details for the design can be viewed on Drawing 5-30.

Structure 4 is a rectangular pond located at the south end of the permit area that is approximately ~~92-90~~ feet wide by ~~628-582~~ feet long and ~~11-12~~ feet deep. This impoundment will be incised into the existing ground. Part of the excavation will be used to construct a 12 foot wide embankment. The spillway will be an open channel that will have ~~vegetated slopes~~ rip-rap min. 6". This pond will control storm water runoff from a watershed of approximately ~~256-96~~ acres. The cleanout and spillway elevation are ~~6823'~~ 6822' and 6834', respectively. Top of the embankment is at elevation 6838'. Details for the design can be viewed on Drawing 5-31.

Open channel spillway details for impoundments 3 and 4 are provided in Drawing 5-32. These spillways are designed for emergencies and are not expected to be used during normal operations.

The outer slopes of the impoundments will be sloped to a maximum grade of 3h:1v. Inside slopes will be graded to a maximum 2h:1v. The slopes will be graded and revegetated for erosion control.

No underground mine workings exist near or under the impoundment structures; therefore subsidence surveys are not provided.

Geologic data for the area where impoundments will be located consists of mainly fine grained alluvium with high clay content. Seepage from the impoundments is expected to

<b>Sedimentation Impoundment Capacities</b>				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent of requirement	Additional Storage (ac/ft)
1	2.6	3.1	119	0.5
2	1.7	2.3	135	0.6
3	6.3	10.9	173	4.6
4	<del>5.72.1</del>	<del>7.55.5</del>	<del>132.261</del>	<del>1.83.4</del>
1B	0.5	0.8	160	0.3

Structure 1 is a rectangular impoundment approximately 136 feet long by 81 feet wide and 9 feet in depth. This impoundment will control storm water run off from the facilities area. The impoundment will be constructed with a 24" drop pipe spillway in order to prevent any oil sheens that may occur from discharging. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 4 feet freeboard. This pond will control storm water from a watershed of approximately 27 acres. The cleanout and spillway elevation are 6911' and 6920', respectively. The top of the embankment is at elevation 6924'. Details for the design can be viewed on Drawing 5-28.

Structure 1B is a small rectangular impoundment that is approximately 40 feet long by 20 feet wide. This impoundment will control storm water run off from the facilities access road system. The impoundment will be constructed with a 24" drop pipe spillway in order to prevent any oil sheens that may occur from discharging. This impoundment will be incised into the existing ground. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum of 2 feet freeboard. This pond will control storm water from a watershed of approximately 5 acres. The cleanout and spillway elevation are 6894' and 6906', respectively. The top of the embankment is at elevation 6908'. Details for the design can be viewed on Drawing 5-28B.

Structure 2 is a rectangular impoundment approximately 188 feet long by 36 feet wide and 9 feet in depth. This impoundment will control storm water runoff from the disturbed areas immediately south of Lower Robinson Creek. The impoundment will be constructed with a 24" drop pipe spillway. Part of the excavated material will be utilized to construct an embankment on the down grade side to provide a minimum 3 feet freeboard. This pond will control storm water runoff from a watershed of approximately 74 acres. The cleanout and spillway elevation are 6891' and 6900', respectively. Top of the embankment is at elevation 6903'. Details for the design can be viewed on Drawing 5-29.

Structure 3 is a valley fill impoundment that will impound an area approximately 484 feet long by 229 feet wide and 9 feet deep. The fill for the impoundment will be constructed from an excavation 198 feet wide by 229 feet long and 8 feet deep. The embankment will be constructed in 2 foot lifts utilizing a dozer. The top of the embankment will be a minimum 12 feet wide. The spillway will be an open channel that will have ~~vegetated~~

~~slopesrip-rap min. 6"~~. This pond will control storm water runoff from a watershed of approximately 300 acres. The cleanout and spillway elevation are 6802' and 6810', respectively. Top of the embankment is at 6814'. Details for the design can be viewed on Drawing 5-30.

Structure 4 is a rectangular pond located at the south end of the permit area that is approximately ~~92-90~~ feet wide by ~~628-582~~ feet long and ~~11-12~~ feet deep. This impoundment will be incised into the existing ground. Part of the excavation will be used to construct a 12 foot wide embankment. The spillway will be an open channel that will have ~~vegetated-slopesrip-rap min. 6"~~. This pond will control storm water runoff from a watershed of approximately ~~256-96~~ acres. The cleanout and spillway elevation are ~~6823'~~ ~~6822'~~ and 6834', respectively. Top of the embankment is at elevation 6838'. Details for the design can be viewed on Drawing 5-31.

Open channel spillway details for impoundments 3 and 4 are provided in Drawing 5-32. These spillways are designed for emergencies and are not expected to be used during normal operations.

The outer slopes of the impoundments will be sloped to a maximum grade of 3h:1v. Inside slopes will be graded to a maximum 2h:1v. The slopes will be graded and revegetated for erosion control.

No underground mine workings exist near or under the impoundment structures; therefore subsidence surveys are not provided.

Geologic data for the area where impoundments will be located consists of mainly fine grained alluvium with high clay content. Seepage from the impoundments is expected to be minimal based on the high clay content of the existing materials. Characterization of the soils is contained in Chapter 2. Acid and Toxic analysis of the soils indicates that water seeping through the alluvium layer will not result in reducing water quality. The acid and toxic analysis for the alluvium can be viewed in Appendix 6-2.

Hydrologic data for the permit area is provided in Appendix 7-1. This data indicates that there will be some seepage through the subsurface that may travel to adjacent drainages. The quantities for this seepage are expected to be minimal and will have minimal impact to the overall hydrologic balance. Even though seepage may occur, analysis of the soils indicates that water quality will not be diminished.

Sedimentation ponds have been designed in compliance with the requirements of R645-301-356.300, R645-301-356.400, R645-301-513.200, R645-301-742.200 through R645-301-742.240, and R645-301-763.

No sedimentation ponds or earthen structures that will remain open are planned.

The sedimentation plan has been designed to comply with the MSHA requirements given under R645-301-513.100 and R645-301-513.200.

any coal mining and reclamation operations in that area and, upon construction, will be certified by a qualified registered professional engineer to be constructed as designed and as approved in the reclamation plan. Any siltation structures which impounds water will be designed, constructed and maintained in accordance with R645-301-512.240, R645-301-514.300, R645-301-515.200, R645-301-533.100 through R645-301-533.600, R645-301-733.220 through R645-301-733.224, and R645-301-743.

The primary controls for limiting suspended solids and sediment to stream flow and runoff outside the permit area is sediment impoundments and diversions ditches. The proposed system described in section 742.110 is designed to control storm water/runoff discharges from the disturbed areas. Discharges from this system are expected to be minimal and infrequent. Discharges that may occur will comply with R645-301-751.

The impoundment and ditch system will be inspected regularly and discharges will be sampled for water quality purposes.

742.220 Sedimentation Ponds.

742.221.1 The proposed sediment ponds are designed to be used individually

742.221.2 The locations for the sediment ponds were selected to be as near as possible to the disturbed areas and are not located in perennial streams

742.221.3 The ponds are designed and will be constructed and maintained to:

742.221.31 The ponds have been designed with excess capacity by at least 15% to allow for adequate sediment storage volume. The following table provides the design capacities in relation to a 24 hour duration, 100 year storm event:

<b>Sedimentation Impoundment Capacities</b>				
Structure	Storage Required (ac/ft)	Design Storage* (ac/ft)	Percent of requirement	Additional Storage (ac/ft)
1	2.6	3.1	119	0.5
2	1.7	2.3	135	0.6
3	6.3	10.9	173	4.6
4	<del>5.72.1</del>	<del>7.55.5</del>	<del>132.61</del>	<del>1.83.4</del>
1B	0.5	0.8	160	0.3

These sedimentation ponds will be surveyed at least annually to ensure that sufficient sediment storage is available in the impoundment. Sediment will be removed from the ponds as required based on results from the surveys. Calculations related to these design capacities can be viewed in Appendix 5-2. Stage-Storage curves for each pond can be viewed on Drawings 5-28 through 5-31.

742.323

As part of the reclamation process, Lower Robinson Creek will be reconstructed to its approximate original location. The design for this reconstruction is shown on Drawings 5-20A and 5-21A. This design includes considerable improvements to the channel compared to the channel's current condition. The current condition is such that less than 25% of the channel within the disturbed area has a flood plain present and most of the slopes are near the angle of repose with fair to poor vegetative cover. The reconstructed sides of the channel for the entire length reconstructed. Sharp corners in the original alignment have been rounded to sinuous curve shapes and rip-rap will be installed in the bottom section of the channel to minimize erosion. The flood plain will be seeded and covered with erosion matting to control erosion until natural vegetative condition can be attained.

742.331 Diversion of miscellaneous flows is planned using four diversion ditches. Two diversions will be primarily used to route runoff from upland, undisturbed areas away from the planned disturbed areas. Diversion ditch 2 has been split to minimize the amount of water from upland routed to Pond 2 (see drawing 5-34), 2B will route water from upland to Lower Robinson Creek and 2A will route water from disturbed area to Pond 2. Diversion ditch 4 is planned to direct water from disturbed areas into sediment impoundment ~~Pond 4~~ Pond 3. The locations of these diversions along with the associated watersheds can be viewed on Drawings 5-27, 5-33 and 5-34. Calculations related to the diversions can be viewed in Appendix 5-2.

742.332 Each diversion was designed for stability and to minimize erosion. In order to accomplish this standard, the diversions were each designed for peak flows during a 100 year, 24 hour storm event. The following summarizes the steps used:

The channel sizing for the four proposed temporary diversion ditches has been evaluated using the TR-55 method to determine peak flows and the Manning's Equation (ME) to determine appropriate dimensions. The TR-55 method of analysis is the same method used to size impoundments and was utilized in this case to provide a peak flow for each diversion during a 100 year, 24 hour storm event. This peak flow was then input into the ME to determine an appropriate open channel design for minimizing the effects of erosion during peak flows. Similar to the impoundment sizing, the Carlson Software Hydrology module was utilized to perform these calculations. The ditch locations, designs and cross sections can be viewed on Drawings 5-33 and 5-34.

The MRP does not contemplate construction of any impoundments meeting the NRCS Class B or C criteria for dams in TR-60, or the size or other criteria of 30 CFR Sec. 77.216.

743.200

No permanent impoundments are planned.

743.300

Design capacities for spillways exceed the 25 year, 6 hour event. The design capacities are provided in the table located in section R645-301-743.130.

#### **744 DISCHARGE STRUCTURES**

744.100

Each pond will be constructed with an emergency spillway, should the capacities of the ponds ever be exceeded. These spillways will provide a nondestructive route for storm water discharge, though the capacities of the ponds are not expected to be exceeded. The design capacities of the ponds are expected to contain each storm event and therefore will provide sufficient detention time to meet Utah and federal effluent limitations. The following is a description of each spillway:

Impoundments 3 and 4 will be constructed with open channel spillways. These spillways are designed to discharge a 24 hour duration, 100 year storm event even though they are not expected to be used during normal operations. They will have rip-rap min. 6" to minimize erosion and spillway slopes will not exceed 3h:1v. Drawing 5-32 provides the details for the open channel spillways.

Impoundments 1, 1B and 2 will be constructed with a drop pipe spillway system. Storm water and snow melt that occurs within the associated watersheds will be routed to these impoundments to contain sediment. These impoundments will have the drop-pipe spillways installed which will allow removal of any oil sheens that may result from parking lots, primary roads or maintenance activities by using absorbent materials to remove the sheen. The drop-pipe spillways are 24" diameter pipes that are vertical in the impoundment. These pipes have a metal cover over the end. This cover is recessed over the pipe by at least an inch, with a gap between the cover and the pipe. This leaves a route for water to discharge once the impoundment is full but prevents debris or pollutants located on the water surface from discharging. This system was chosen for these two impoundments based on their locations in relation to the facilities and primary roads. This discharge system will be constructed for precautionary measures only since pollutants are not expected in the impoundments during normal operations.

The drop pipe spillways for impoundments 1, 1B and 2 will be of nonerodible construction. The open channel spillways for impoundments 3 and 4 will be grass lined rip-rap min. 6" and are designed to carry short-term, infrequent flows at non erosive