

**FIELD WIDE STORMWATER MANAGEMENT PLAN
FOR CONSTRUCTION ACTIVITIES**

**AREA 5
DJ BASIN DRILLING PROGRAM
COLORADO**

**REVISED
SEPTEMBER 2009**

Prepared for:

**PETROLEUM DEVELOPMENT CORPORATION
3801 Carson Avenue
Evans, Colorado 80620**

Prepared by:

**LT ENVIRONMENTAL, INC.
4600 West 60th Avenue
Arvada, Colorado 80003
(303) 433-9788**



2.0 INTRODUCTION

On June 30, 2005, the State of Colorado stormwater regulation went into effect to require Colorado Discharge Permit System (CDPS) permits from the Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Division (WQCD) for stormwater discharges from construction activities associated with small construction activity for oil and gas sites that disturb between one and five acres. The Stormwater Management Plan (SWMP) was prepared for Petroleum Development Corporation (PDC) to be used for the Area 5 DJ Basin Drilling Program area in accordance with good engineering, hydrologic, and pollution control practices to ensure that Best Management Practices (BMPs) are selected, installed, implemented, and maintained to protect surface water.

This SWMP contains required elements of a SWMP associated with PDC's construction activities for Area 5, as defined in the CDPS General Permit for Stormwater Discharges Associated with Construction Activity, Authorization to Discharge Under the Colorado Discharge Permit System (Permit No. COR-030000, re-issued and effective July 1, 2007). PDC applied for coverage under the stormwater general permit and was issued COR-035071 for Area 5 in the DJ Basin Drilling Program on February 10, 2004. The application and permit number were renewed at the re-issuance of the general permit. A copy of the permit documents for Area 5 is provided in Appendix A.

3.0 SWMP ADMINISTRATOR

The Construction Supervisor who will also serve as the SWMP Administrator for PDC is responsible for the implementation and revision of the SWMP. The Construction Supervisor has the authority to dedicate the financial and human resources to implement the SWMP. The Construction Supervisor with this responsibility is:

Mr. Mike Schweizer - Construction Supervisor, Evans, Colorado

Office: (970) 506-9272

Mobile: (970) 215-5608

The Construction Supervisor will ensure that the SWMP is followed and delegates responsibility for coordination of the SMWP inspections and maintenance of stormwater records to designated personnel.

The Construction Supervisor will manage the SWMP Team. Other foremen or designated personnel may also assist in stormwater inspections and maintenance of records. Overall, the SWMP Team is responsible for:

- Implementing spill/upset clean up procedures;
- Notification to local authorities and local residents in the event that a significant release of stormwater and sediment leaves a pad area;
- Coordinating various stages of best management practices and implementation;

- Conducting inspections;
- Maintenance of all records; and
- Coordination of a preventive maintenance program and housekeeping measures.

4.0 SITE DESCRIPTION

4.1 Nature of Construction Activity

PDC currently owns or leases oil and natural gas mineral rights in the Wattenberg Field in the DJ Basin, Colorado. Area 5 lies within Larimer, Boulder, and Weld Counties and encompasses the following: Township 4N Range 69W, 4N 68W, 4N 67W, 4N 66W, 3N 69W, 3N 68W, 3N 67W, 3N 66W, 2N 69W, 2N 68W, 2N 67W, 2N 66W, 1N 69W, 1N 68W, 1N 67W, 1N 66W; and the following Sections of 4N 65W, 3N 65W, 2N 65W, 1N 65W: 6, 7, 18, 19, 30, and 31. Individual pad sites within the permitted area range from $\frac{3}{4}$ acre to five acres in size, including site-specific access roads and pipelines. A map of the project area is provided as Figure 1.

4.2 Sequence of Major Activities

The overall development of oil and natural gas pad sites is generally accomplished in three distinct work phases: development, production, and abandonment. The work completed and sequence of events for each phase are briefly discussed below.

Approximately $\frac{3}{4}$ acres to five acres of surface terrain are disturbed during the development of a new pad site. The development phase includes the following sequence of activities: pad construction, well drilling, well completion, gas flowline installation, access road building, and well pad reclamation.

The production phase includes the operation and maintenance activities during natural gas production. The typical equipment on a pad site during the production phase consists of a wellhead, a separation unit, one or more 300-barrel (typical) capacity aboveground tanks for condensate (if needed), and a vessel for storing produced water or condensate. Oil and gas wells in the field are projected to produce for approximately 20 to 30 years.

When the natural gas production of a well is exhausted it will be abandoned. Abandonment includes plugging and capping the well and removal of all surface equipment. The pad area may need to be reclaimed by contouring disturbed soils to conform to the surrounding terrain.

Gas activity types requiring ground surface disturbance include: a new drill site, a facility site, a plugged and abandoned (P&A) site, and an excavation/other site as well as pipeline construction and access roads. Each of these types is described as follows:

- A new drill site includes pad construction, well drilling, well completion, gas flowline installation, access road building and well pad reclamation. Pad reclamation is accomplished by backfilling the reserve pit (if applicable), contouring disturbed soils to conform to the surrounding terrain, replacing the stockpiled top soil, and seeding of disturbed soil areas in order to re-establish coverage vegetation.

- A facility site includes pad construction, tank and sump installation (if applicable), gas flowline installation, access road building and pad reclamation. Pad reclamation is accomplished by contouring disturbed soils to conform to the surrounding terrain, replacing the stockpiled top soil, and seeding and mulching and/or application of Erosion Control Blankets of disturbed soil areas in order to re-establish vegetation.
- A P&A site includes well abandonment, flowline re-routing or abandonment, access road decommissioning, and removal of all oil/gas field operations from the pad site. Pad reclamation is accomplished by contouring disturbed soils to conform to the surrounding terrain and seeding of disturbed soil areas in order to re-establish vegetation.
- An excavation/other site includes excavation for a variety of reasons. Excavation areas will be reclaimed by backfilling and contouring the disturbed area to conform to the surrounding terrain and seeding of disturbed soil areas in order to re-establish vegetation.
- Pipelines connect pad sites to other gathering operations within the basin. Pipeline connections are regularly maintained, added to, or repaired. Pipeline maintenance can include excavation, backfilling, re-contouring the disturbed area, and stabilization as listed above.
- Access roads provide access to the drill sites, pad sites, pipeline connections, facility sites, excavation sites, and P&A sites listed above. Roadwork construction and maintenance is included in this SWMP for these access roads. Road reclamation is accomplished by contouring disturbed soils to conform to the surrounding terrain, replacing the stockpiled top soil, and seeding of disturbed soil areas in order to re-establish vegetation. Other than road stabilization, all affiliated cut and fill plus roadside ditch applications need to meet the “final stabilization” requirements as per the CPPHE Construction Stormwater Permit. Once the roadway and affiliated disturbed areas are stabilized per the 70% ambient requirements, inspections may cease. LTE will coordinate with PDC to review finally stabilized sites as they can cease inspections provided that the SWMP is updated to reflect inspection requirements.

4.3 Area of Disturbance

The total field wide area of disturbance is approximately 999 acres. Individual pad sites within the permitted area range from $\frac{3}{4}$ acre to five acres in size, including site-specific access roads and pipelines. The site information is kept on PDC’s stormwater inspection database. PDC’s database contains a current, comprehensive list of all PDC construction sites. The database is intended to manage and track all site-specific stormwater records for PDC.

For the purposes of this SWMP, the site-specific information required to be included in the SWMP (Appendix B) will actually be comprised of the PDC database. The site-specific information is updated during the course of the stormwater inspections. In addition to the site-specific inspection reports, the database can produce additional reports to manage and track the needed BMP repairs within a specific time-period. These reports are provided to the BMP contractor on a regular basis, to document and maintain stormwater requirements.

4.4 Soil Description

The DJ Basin is a large area covering Adams, Boulder, Broomfield, Denver, Larimer, and Weld Counties. PDC's Area 5 operation is within Larimer, Weld, and Bolder Counties. Topsoil varies within the area, and is classified as loam, clay loam, silty clay loam, and clay according to the U.S. Natural Resources Conservation Service (<http://websoilsurvey.nrcs.usda.gov/app/>). Percentages of each type of topsoil vary widely throughout the area, with it being primarily loam and clay loam in the southern portion of Area 5. The west-northwest portion of Area 5 is dominated by clay and silty clay loam topsoil.

4.5 Vegetation Description

The well pads in the DJ Basin are primarily surrounded by irrigated and dry land, crop land, tall grass, short grass prairie land, low shrubs, and brush rangeland. In some cases, pads are surrounded by urban land, but this is less common. Vegetation surrounding a pad site can vary from zero to approximately 75% ground cover. Specific vegetation data at each pad site are entered on the site-specific maps.

4.6 Non-Stormwater Discharges

The following is a summary list of non-stormwater discharges which are allowed under the stormwater permit:

- Discharges from emergency fire-fighting activities or a fire hydrant;
- Landscape irrigation or return flow;
- Uncontaminated springs;
- Groundwater; and
- Stormwater dewatering.

4.7 Receiving Waters

The stormwater discharged may directly impact unnamed and named tributaries to, as well as the South Platte River. Site-specific tributaries will be noted on the individual site maps.

PDC's pads or access roads do not intrude or encroach on any wetland acreage. If a wetland is designated to be within a pad construction area, PDC will consult with the Army Corp of Engineers regarding Section 404, as applicable.

5.0 SITE MAPS

The site maps are kept in PDC's database. PDC's database is intended to manage and track all site-specific stormwater records for PDC. The database consists of current inspection forms with supporting Visio map attachments. Maps are updated at every inspection interval and dated to show changes from one inspection to the next.

For the purposes of this SWMP, the site-specific map information required to be included in the SWMP (Appendix B) will actually be comprised of the PDC database. The site-specific information is updated during the course of the stormwater inspections. In addition to the site-specific inspection reports, the database can produce reports to manage and track the needed BMP repairs within a specific time-period. These reports are provided to the BMP contractor on a regular basis, to document and maintain stormwater requirements.

Construction site boundaries; ground surface disturbances; areas of cut and fill; storage areas for building materials, equipment, soil or waste; structural BMP locations; non-structural BMP locations (as applicable); locations of springs, streams, wetlands or other surface waters; and other pertinent site-specifics are shown on maps attached to the site-specific SWMP Inspection Reports (Appendix B). Site-specific features may be hand-drawn.

6.0 STORMWATER MANAGEMENT CONTROLS

6.1 Identification of Potential Pollutant Sources

To identify, evaluate, and assess potential sources of stormwater runoff pollutants that may exist at a pad, access road, or pipeline site, the following activities and pollutant sources were evaluated:

- Disturbed and stored soils;
- Vehicle tracking controls;
- Management of contaminated soils;
- Loading and unloading operations;
- Outdoor storage activities;
- Vehicle and equipment maintenance and fueling;
- Dust or particulate generating processes or activities;
- Routine maintenance activities;
- On-site waste management practices;
- Concrete truck washing;
- Dedicated concrete and asphalt batch plants;
- Non-industrial waste sources; and
- Potential spills.

6.1.1 Disturbed and Stored Soils

Disturbed soil and excavated materials will be stored next to the construction site. Topsoil and other soils will be stockpiled separately and seeded. Excavation in sensitive areas will be conducted as specified by the landowner/agency representative.

Materials excavated will be utilized as backfill when practical. An exception may be excess rock generated by rock blasting excavation activities. In these areas, some select backfill materials may be required to protect the project area.

If contaminated soils are encountered during excavation at a PDC site, all activity will be stopped until the situation can be assessed. The Construction Supervisor for PDC will be contacted for further direction.

All cut slopes made in steep rolling terrain during construction will be re-graded and contoured to blend into the adjoining landscape and natural drainage patterns will be re-established to as near pre-disturbance levels as possible.

Temporary workspace areas will be restored to approximate pre-construction conditions.

6.1.2 Vehicle Tracking Controls

Properly constructed and graveled roads provide the best off-site tracking control. Access road entrances adjacent to paved county roads are often graveled to prevent or minimize any off-site soil tracking from pad areas or access roads. In most instances, cattle guards are used to drop off caked mud before the vehicle exits the site area. In addition, minimizing site access and contractor education will be utilized.

6.1.3 Management of Contaminated Soils

If contaminated soils are excavated at a PDC site, additional BMPs will be employed to ensure containment of any stormwater runoff. In addition, stockpiles of contaminated soil will be removed from the site and disposed as soon as possible. Additional information regarding management of contaminated soils, material handling and spill prevention can be found in PDC's Spill Prevention Control and Countermeasure (SPCC) Plan, DJ Basin, Colorado, General Field Plan, located at PDC's Evans, Colorado office.

6.1.4 Loading and Unloading Operations

The majority of loading and unloading activities occur during well drilling and well completion activities. Well drilling and completion surfactants, friction reducers, dilute hydrochloric acid, potassium chloride solutions, drilling mud, condensate, and other fluids are transported or unloaded directly into the well from trucks, on site tanks, and/or the reserve pit. Dry drilling mud components are contained in paper bags and are stacked on pallets, which are unloaded using a forklift or by hand. Other activities include unloading of drill pipe, completion pipe (casing), and natural gas line pipe, which are not potential pollution sources. In the event of a spill, the SWMP material handling and spill prevention procedures will be followed (see Section 6.2.4).

6.1.5 Outdoor Storage Activities

The activities associated with this pollution source are storage of material at the staging areas and potential for spills and leaks from these materials. BMP's selected to control this source are installation and use of material storage and staging areas, materials management practices, personnel training, providing spill kits and following the Potential Spills and Materials Handling and Spill Prevention information (see Sections 6.1.13 and 6.2.4). A list of chemical products typically used at a PDC construction site is included as Table 1.

6.1.6 Vehicle and Equipment Maintenance and Fueling

PDC does not fuel or maintain construction-related vehicles or equipment located within the PDC Area 5 DJ Basin Drilling Program.

6.1.7 Dust or Particulate Generating Processes or Activities

Dust and/or particulates generated from vehicle traffic on graveled access roads may produce fugitive emissions. Dust and particulate generation are highest during dry and hot times of the year. If dust from vehicle traffic on graveled access roads becomes significant, dust suppression procedures will be implemented that include road watering.

6.1.8 Routine Maintenance Activities

Routine maintenance activities involving fertilizers, detergents, fuels, solvents and oils are not conducted at the PDC construction sites. However, noxious weed herbicides will be applied annually in some areas to control noxious weeds. Herbicide application will always be conducted by certified and trained individuals, and with consideration for runoff potential to nearby surface waters.

6.1.9 On-site Waste Management Practices

All waste from materials imported to the construction site are placed in appropriate containment and then removed for disposal/recycling to an appropriate licensed disposal/recycling facility. No waste materials will be buried, dumped, or discharged to waters of the state.

6.1.10 Concrete Truck Washing

Concrete truck/equipment washing, including the concrete truck chute and associated fixtures and equipment, is not conducted within the PDC Area 5 DJ Basin Drilling Program.

6.1.11 Dedicated Concrete and Asphalt Batch Plants

No dedicated concrete or asphalt batch plants are located within the PDC Area 5 DJ Basin Drilling Program.

6.1.12 Non-Industrial Waste Sources

Cleanup of trash and discarded materials will be conducted as noticed. Cleanup will consist of patrolling the roadway, access areas, and general work areas in order to pick up trash, debris, scrap, or other discarded materials.

All waste from materials imported to the construction site are placed in appropriate containment and then removed for disposal/recycling to an appropriate licensed disposal/recycling facility. This also includes sanitary sewage facilities (typically portable), which will be placed, anchored, and maintained with proper care.

6.1.13 Potential Spills

In the event of any spills or leaks the SWMP Administrator for PDC will be contacted immediately for further direction. Additional information regarding management of contaminated soils, material handling and spill prevention can be found in PDC's SPCC Plan, DJ Basin, Colorado, General Field Plan, located at PDC's Evans, Colorado office.

6.2 Best Management Practices (BMPs)

BMPs for sediment and erosion control will be accomplished through a combination of construction techniques, vegetation and re-vegetation, administrative controls, and structural features. Typical configurations of structural controls discussed below and technical drawings with references are provided in a BMP Manual (Appendix C). BMP selection is guided by the criteria listed in Table 2. Structural and non-structural BMPs are discussed in the following sections, and are summarized in Table 3.

6.2.1 Structural Practices for Erosion and Sediment Control

Structural practices primarily include physical attributes of the pads and access roads designed to reduce erosion and control stormwater or sediment movement.

6.2.1.1 Erosion Control

Construction of the pads and access roads requires the removal of vegetative cover and topsoil, thereby increasing peak flood flows, water velocity, and the volume of stormwater runoff. An increase in water runoff volume and velocity may result in increased erosion. Erosion and runoff control procedures that will be used to mitigate and reduce the erosive transport forces of stormwater during and after construction of the pipelines will include but will not be limited to the following:

- Diversion and control of runoff water;
- Diversion and control of runoff water;
- Vegetation establishment and maintenance;
- Berms;

- Check Dams;
- Wattles;
- Erosion Control Blanket (ECB); and
- Application and maintenance of mulches, tackifiers, tracking and contouring.

Existing vegetation cover and topsoil are removed only where necessary for the operation of equipment and construction of the pads, access roads, and pipelines. Refer to Tables 2 and 3 for a list of all BMPs to be used throughout the PDC Area 5 DJ Basin Drilling Program. Appendix C includes details on BMP installation and maintenance procedures.

6.2.1.2 Sediment Control

The control of sediment contained in stormwater runoff will be accomplished by the use of sediment controls. Sediment controls allow the detention of suspended particles via gravity, filtering or entrapment. Sediment controls that will be used to mitigate and control sediments generated from the erosive transport forces of stormwater during and after construction of a pad will include but will not be limited to the following:

- Silt Fence;
- Wattles; and
- Stabilized Construction Entrance (Cattle Guard).

Refer to Tables 2 and 3 for a list of all BMPs to be used throughout the PDC Area 5 DJ Basin Drilling Program. Appendix C includes details on BMP installation and maintenance procedures.

6.2.1.3 Detailed Structural and Administrative Site Management Practices

The following structural and administrative site management practices are expected to reduce, minimize and control erosion and sediment transport:

- In order to minimize disturbances associated with installation of pads, access roads, and pipelines, level and gently sloping terrain outside the construction project area will not be graded, except where necessary.
- To prevent tracking of sediment mud and rocks onto public roads, portions of access roads may be graveled, as appropriate. Other means such as track pads/angular rock or cattle guards may be utilized if appropriate.
- Silt fence or straw wattles will be installed as needed on down-gradient portions of project areas.
- Side hill cuts (cut slopes) will be kept to a minimum to protect local resources while providing a safe and stable plane for the efficient and safe use of equipment.

- Where conditions warrant, erosion control structures such as berms or culverts will be constructed to divert water away from project areas. These control structures will also reduce soil erosion along and adjoining areas disturbed during construction.
- During construction near perennial streams, lakes or wetlands, silt fence or straw wattles may be utilized in order to prevent suspended sediments from reaching down slope watercourses, streams, lakes or wetlands.
- Where appropriate, wattles or silt fence will be constructed adjacent to crossings to reduce potential sedimentation in streams or wetlands.
- In areas that have steep slopes, wattles, erosion control blankets, or runoff diversions may be installed.
- During the reclamation of the pads, access roads and pipelines, all cut and fill slopes in steep terrain will be graded and contoured to blend into the adjoining landscape. Natural drainage patterns will also be re-established. When possible cut and fill slopes will be constructed so they are no steeper than a 1 to 3 ratio.
- Reclaimed pads may have a fence constructed around areas that have been seeded. These fences will be installed in order to keep livestock and vehicles off reseeded areas.
- Pipelines connect pad sites to other gathering operations within the basin. Pipeline connections are regularly maintained, added to, or repaired. These sites are included in this SWMP. Pipeline maintenance can include excavation, backfilling, and re-contouring the disturbed area, as listed above.

Appendix C includes details on BMP installation and maintenance procedures.

6.2.1.4 Implementation of Structural Practices

The following structural practices (sediment controls) may be utilized at disturbed areas: vegetative buffers, wattles, berms, silt fence, check dams, or equivalent sediment controls. These sediment control structures will be installed so as to protect down slope surface waters, wetlands and roads from sediment flow due to runoff from a precipitation or snow melt event.

All graded surfaces, walls, dams and structures, vegetation, erosion and sediment control measures and other protective devices identified in the site plan will be maintained, repaired, and restored as necessary.

Table 3 contains a summary list of structural and non-structural BMPs.

6.2.2 Non-Structural Practices for Erosion and Sediment Control

Erosion and sediment can also be controlled via non-structural BMPs. Non-structural BMPs are not engineered as structural and are capable of limiting the amount of potential pollutants available to reach receiving water bodies. Non-structural BMPs can achieve the same effect as

structural BMPs through erosion control, filtration, trapping and the settling of sediment load within a perimeter.

PDC has implemented non-structural practices for stormwater management into their pipeline site development, including Program Oversight, Construction Site Planning and Management, and Materials Management. Table 3 summarizes the details of such practices.

Pad sites can include a slope to the reserve pit or a buffer zone of natural vegetation used as a non-structural BMP to inhibit sediment travel offsite and minimize the footprint of the pad. Appendix C includes a typical pad site figure with the use of a buffer zone as a BMP.

All disturbed areas of the site will be re-vegetated in accordance with the CDPS General Permit re-vegetation requirements to coincide with existing site vegetation patterns. Final site grading will reflect existing grades in order to maintain pre-construction discharge patterns. Crimp mulching, using hay or cereal grain straw will be used in conjunction with the seeding for final stabilization.

6.2.3 Phased BMP Implementation

The development of access roads, pads, and pipelines is generally accomplished in three distinct work phases. The first phase is the development (construction/completion/reclamation), the second phase is the production (operation/maintenance), and the third phase is the abandonment with final reclamation. Each work phase is briefly discussed below.

During pre-construction, drilling, and other active construction, the focus will be primarily on containment type BMPs. An example would be a continuous berm to contain stormwater pollutants on site. During this phase, stormwater runoff is specifically controlled so as not to leave the pad site.

The development phase includes clearing and grubbing of construction areas, excavation activities, and trenching through rural landscape and intermittent unnamed dry washes and streams. BMPs utilized during active construction include the following:

- vehicle tracking controls;
- silt fence and or berms on the down-gradient limit of construction for erosion and sediment control;
- sediment control logs (wattles) or equivalent BMPs in unnamed dry washes and streams;

BMPs will be implemented during construction to control and minimize any runoff of sediment and erosion associated with construction activities. Reclamation activities during this phase are accomplished by contouring disturbed soils to conform to the surrounding terrain, replacing any stockpiled topsoil, seeding, and mulching of disturbed soil areas in order to re-establish vegetative cover. For completed sites, containment BMPs are generally removed and areas are re-seeded. These are less active construction periods and less attention is needed regarding runoff when reclamation types of BMPs are put in place to mitigate the potential pollutants.

The production phase includes the operation and maintenance activities during construction. The stabilized staging areas will provide for storage of staging materials and equipment and be used to define the contractor mobilization area. The staging areas can contain a construction trailer; a parking lot; dumpsters; a storage area for heavy on-site equipment; unloading/loading areas and a portable sanitary facility. No fuel storage tanks will be present in the staging areas but mobile fueling will take place within the construction limits of the project.

Dirt/mud will be removed from staging areas as needed. Stabilized staging areas will be inspected for adequate vehicle tracking control and perimeter control. The stabilized staging areas should be repaired or modified as needed. Reclamation activities during this phase include maintenance of access roads via stabilization of the given roadways, and long term maintenance of the erosion and sediment control structures.

When the construction activity is completed, all disturbed areas of the site will be re-vegetated with seed mixtures based on existing native vegetation. Abandonment with Final Reclamation activities are accomplished by contouring disturbed soils to conform to the surrounding terrain, by replacing any stockpiled topsoil, and by seeding of disturbed soil areas in order to re-establish cover vegetation. Erosion control blankets, mulching, using hay or cereal grain straw, may be used in conjunction with the seeding for final stabilization. Permanent stormwater BMPs, such as culverts and check dams, will remain in place after final stabilization.

Depending upon the type of site, the site terrain, and the phase of construction, different stormwater BMPs will be utilized. Various BMP options are listed in Table 2, and design specifications are shown in the BMP Manual (Appendix C).

The above discussion focuses primarily on pad sites and access roads. Phased BMP installation activities for pipeline sites are similar to those discussed above. Since these sites usually involve deeper trenching and excavation work, pre-construction BMPs may include additional containment around soil stockpiles, and may involve temporary access road construction BMPs, instead of the pipeline site access roads which are more or less permanent features of the typical pipeline site. Upon backfilling of trenched materials, reclamation activities are accomplished by contouring disturbed soils to conform to the surrounding terrain, replacing any stockpiled topsoil, seeding, and mulching of disturbed soil areas in order to re-establish vegetative cover.

6.2.4 Material Handling and Spill Prevention

Consistent with the permit requirements, all potential pollutants other than sediment will be handled and disposed of in a manner that does not cause contamination of stormwater. Non-sediment pollutants that may be present during construction activities include petroleum products used in construction of a pad, pipeline, or tank battery including pipe joining materials and waste, and fertilizer used for final stabilization. Material Safety Data Sheets (MSDS) for materials to be used or that are produced, are maintained at the Evans, Colorado office and on site during drilling.

Refueling and lubrication of vehicles and equipment will be conducted a minimum of 100 feet from flowing streams and wetlands. Any spills will be promptly remediated and contaminated materials hauled off-site and properly disposed of/recycled. Quantities of fuel and lubricants will

be limited to “as-needed” for the immediate operations underway. In general, small spills will be handled by PDC personnel. The SWMP Administrator or his designee will handle spills and emergencies. In most cases, an absorbent material is used to pick up the spill. The spill response equipment is also located at PDC’s Evans, Colorado office. In the situation of a larger spill, the SWMP Administrator would be notified and a contractor would be called to respond to the spill. For the protection of spill response personnel, all drums, tanks, and other containers are clearly labeled to identify contents, in the event of a spill. Additional information regarding material handling and spill prevention can be found in PDC’s SPCC Plan, DJ Basin, Colorado, General Field Plan, located at PDC’s Evans, Colorado office.

6.2.5 Dedicated Concrete or Asphalt Batch Plants

PDC does not have or subcontract any dedicated concrete or asphalt batch plants for its pad site development or construction in the Area 5 DJ Basin Drilling Program.

6.2.6 Vehicle Tracking Control

PDC will employ BMPs to minimize vehicle tracking. Further discussion on this topic is in Section 6.1.2 of this SWMP.

6.2.7 Waste Management and Disposal, Including Concrete Washout

Waste management and disposal are further discussed in Sections 6.1.9 and 6.1.12 of this plan. Concrete washout does not occur at PDC’s sites, and therefore, will not be a potential pollutant to stormwater.

6.2.8 Groundwater and Stormwater Dewatering

Construction dewatering may take place on a limited basis at PDC sites. The permit allows for conditional discharge of construction dewatering to the ground (to infiltrate), however no groundwater from construction dewatering can be discharged as surface runoff or to surface waters. For large construction projects with planned dewatering activity, PDC will apply for a separate dewatering permit from the state, as required.

6.2.9 Stormwater Practices and Landowners

PDC will always go above and beyond to accommodate landowners and at the same time, maintain compliance with the CDPS general permit. If a landowner has concerns with the installation or use of certain BMPs, PDC will discuss other options with the landowner for BMP implementation that are state compliant. If landowners are insistent upon particular practices on their land, or have previous agreements with PDC regarding well pad site installations, PDC will attempt to negotiate the best solution for all parties that maintains stormwater compliance.

7.0 FINAL STABILIZATION AND LONG-TERM STORMWATER MANAGEMENT

7.1 Reclamation

Unless otherwise directed by the landowner or a jurisdictional authority, rocks, cut vegetation, and other surface material temporarily stockpiled during construction will be redistributed as backfill on the project area. During reclamation, sediment BMPs will remain in use.

Disturbed areas will be seeded using seed mixes appropriate to the location (Table 4). Local soil conservation authorities with the U.S. Natural Resources Conservation Service, surface owners and/or reclamation contractors familiar with the area may be consulted regarding the correct seed mix to be utilized.

On terrain where drill seeding is appropriate, seed may be planted using a drill equipped with a depth regulator to ensure proper depth of planting. The seed mix will be evenly and uniformly planted over the disturbed area. Drilling will be used where topography and soil conditions allow operation of equipment to meet the seeding requirements of the species being planted. Broadcast seeding will occur on steep terrain and on areas where the cut vegetation and rocks were redistributed over a right-of-way.

Seeding will be done when seasonal or weather conditions are most favorable according to schedules identified by the jurisdictional authority or reclamation contractor. Whenever possible, seeding will be timed to take advantage of moisture, such as early spring or late fall, which will benefit from winter precipitation.

Seed mixes will be planted in the amount specified in pounds of pure live seed per acre (Table 4). No primary or secondary noxious weeds will be in the seed mix.

The re-establishment of vegetative cover as well as watershed stabilization measures will be scheduled during the working season and before the succeeding winter. Re-vegetation will be accomplished as soon as practical following the reclamation of a pad, pipeline or road.

Mulch will be laid down during re-vegetation as appropriate. The cut vegetation and rocks will act like mulch in the areas where they are applied. Where straw mulch is applied, the mulch will be anchored via crimping into the soil.

If soil amendments are necessary, the rates of application will be based on site-specific requirements of the soil.

A special condition exists for pipeline sites within crop lands. According to the CDPHE Stormwater Fact Sheet dated July 2007:

When portions of an oil and gas site are restored to crop land in accordance with the COGCC rules, and returned to the control of the farmer following interim reclamation, permit coverage is no longer required for those areas, and it is not necessary for the oil and gas site to either stabilize or reassign permit coverage for the area restored to crop land.

7.2 Post Construction Structural Measures

ECBs along with seeding and mulching and/or permanent structural measures may be installed on steep slopes and at wetland and stream crossing boundaries.

After restoration and reclamation work is complete, required repairs to vegetation and erosion and sediment control BMPs will be completed as required.

7.3 Finally Stabilized

According to stormwater regulations, “finally stabilized means that all ground surface disturbing activities at the site have been completed and all disturbed areas have been either built on, paved, or a uniform vegetative cover has been established with an individual plant and a density of at least 70 percent of pre-disturbance levels, and the vegetation cover is capable of providing erosion control equivalent to pre-existing conditions, or equivalent permanent, physical erosion reduction methods have been employed.”

A special condition exists for oil and gas pipeline sites regarding pavement. According to the CDPHE Stormwater Fact Sheet dated July 2007:

Areas developed as stabilized unpaved surfaces as needed for operation of the facility after interim reclamation also qualify as “finally stabilized”. The term “stabilized unpaved surfaces” includes dirt road surfaces and the portions of the well pad surfaces that cannot be revegetated due to operational necessity, but does not include slopes, ditches and other areas where revegetation is necessary. Stabilized unpaved surfaces must be prepared in such a way as to minimize erosion, such as preventing rill erosion on pad surfaces or roads.

8.0 MAINTENANCE PROCEDURES AND INSPECTIONS

8.1 Preventive Maintenance

The following preventive maintenance procedures will be implemented to reduce or eliminate potential stormwater contamination sources that may exist on the site:

- Storage containers, fuel tanks, and equipment used during construction activities should be visually inspected routinely for obvious leaks. These inspections should be conducted by site and contractor personnel as they perform their routine duties.
- Drums will be properly labeled so an enclosed substance can be quickly identified. OSHA-approved labeling and sign systems will be followed for all secondary containers.
- Erosion damage to the berms, outfalls, silt barriers, collection channel, containment ponds, and any other erosion and sediment controls will be repaired as soon as practical.
- Areas of stained soil will be inspected in order to identify the sources of the staining. Contaminated soil will be removed and properly disposed.

- Energy dissipating material, such as riprap, cobbles or gravel will be placed, or existing materials will be utilized at the stormwater outfalls to prevent erosion damage. Barrow ditches should be free from vegetation and debris which may cause impounding of stormwater.

Additional preventative maintenance practices include good housekeeping, appropriate material storage, and waste removal, as discussed below.

8.1.1 Good Housekeeping

In accordance with BMPs that provide procedures to eliminate contamination, direct, divert, and contain stormwater, PDC has implemented a number of good housekeeping practices. These practices will help prevent sediment, trash, and toxic or hazardous substances from entering navigable waters.

Housekeeping practices include regular cleaning, organization and maintenance of pads, access roads, and pipeline equipment and erosion and sediment control structures throughout the project. Areas where chemicals are stored and used at the project should be stored in buildings or containers where there is limited potential for stormwater contact.

The following items will be addressed in order to maintain a clean and orderly site during the development, production, and abandonment phases of work:

- Inspect pads, access roads, and pipeline areas routinely;
- Correct deficiencies noted during inspections;
- Clean and maintain stormwater management structures and components;
- Routine trash collection and proper disposal;
- Familiarize employees and contractors with spill clean-up equipment and storage locations; and
- Familiarize employees and contractors with good housekeeping procedures and pad pollution prevention procedures.

8.1.2 Material Storage

At the material storage areas:

- Storage containers will be stored away from direct traffic to prevent accidents. They will also have proper labels;
- Dumpsters and trash receptacles will be enclosed in order to prevent the dissemination of refuse;
- Storage areas will be kept free of refuse;

- Chemical substances used on site will be properly labeled and will have proper spill containment; and
- Chemical substance containers will be clearly labeled with a MSDS kept on file.

8.1.3 Waste Removal

All waste from materials imported to the construction site will be removed for disposal/recycling to an appropriate licensed disposal/recycling facility, including sanitary sewage facilities (typically portable). No wastes of imported materials will be buried, dumped, or purposely discharged to waters of the state. There are no other pollutant sources from areas other than construction areas.

8.2 Inspections

Inspections will be conducted to document the status of erosion and sediment control structures and re-vegetation efforts. Inspection forms will document non-compliance conditions, including any uncontrolled releases of sediment or other contaminants, additional BMPs that are needed, or repair and maintenance issues. Required actions or modifications, as documented on the SWMP Inspection Report, will be implemented in a timely manner after the inspection. Routine inspections may be conducted along access roads and pipelines during all phases of work and after a precipitation-related event. All inspection observations will be recorded on the SWMP Inspection Report. The form provides a standardized format that will be completed during all inspections, and includes a signature line for the inspector to ensure compliance with the regulations. The site-specific information is updated daily, during the course of the stormwater inspections. In addition to the site-specific SWMP Inspection Reports, the database can produce reports to manage and track the needed BMP repairs within a specific time-period. These reports are provided to the BMP contractor on a regular basis, to document and maintain stormwater requirements.

For stormwater regulation purposes, construction sites have been divided into stormwater inspection stages: Active, Completed, and Final Stabilization. For the purposes of this SWMP, only Active and Completed sites will be inspected. Winter conditions and precipitation events trigger different inspection routines. Each of the stormwater inspection stages and weather conditions are discussed below. Once a Completed Site reaches final stabilization, it will be removed from this stormwater construction permit program.

Personnel responsible for inspections will be trained to evaluate stormwater management concerns, erosion and sediment control BMPs, and to evaluate the construction site and surrounding area vegetation.

8.2.1 Active Stage/14-day Inspection

The construction phase of work is classified as the Active stage, according to stormwater regulations. The inspection frequency is every 14 days during the Active stage and must be conducted within 24 hours after the end of any precipitation or snowmelt event that causes surface erosion.

The pads, access roads, pipelines and associated disturbed areas, and any stored materials that are exposed to precipitation will be inspected for evidence of, or the potential for pollutants that may enter the drainage system. Erosion and sediment control systems that are identified on the site-specific SWMP Inspection Report will be inspected to ensure that they are in good condition and operating properly.

8.2.2 Completed Stage/Monthly Inspection

Once construction is completed and the site has been prepared for final stabilization (including completion of appropriate soil preparation, amendments and stabilization practices), the site (or portion of a site) is considered a Completed Site (for purpose of the stormwater permit). Note: only construction activities that result in a disturbance of the ground surface must be completed. Construction activities that can be conducted without disturbance of the ground surface, such as certain well completion activities, would not prohibit a site from otherwise qualifying as a Completed Site. (Completed Sites still require permit coverage until final stabilization criteria have been met.). However, because slopes and other disturbed areas are not vegetated, erosion in these areas still occurs which requires maintenance activities such as regrading, erosion control blankets, and seeding of problem areas. As such, inspections must continue in order to address these situations. The SWMP for the site must be amended to indicate those areas that will be inspected at this reduced frequency.

For sites or portions of sites that meet the following criteria, but final stabilization is not achieved due to a vegetative cover that has not become established, a thorough inspection will be conducted at least once every month, and post-storm event inspections are not required. This reduced inspection schedule is *only* allowed if:

- all construction activities that will result in surface ground disturbance are completed;
- all activities required for final stabilization, in accordance with the SWMP, have been completed, with the exception of the application of seed that has not occurred due to seasonal conditions or the necessity for additional seed application to augment previous efforts; and
- the SWMP has been amended to indicate those areas that will be inspected in accordance with the reduced schedule.

8.2.3 Final Stabilization Stage

When any pad sites, access roads, pipelines and associated areas have reached final stabilization, no further inspections will occur. All temporary site-specific BMPs no longer required will be removed.

8.2.4 Winter Conditions

Inspections will not be required where construction activities are temporarily halted because snow cover exists over the entire site for an extended period as long as melting conditions do not exist. The following information must be documented in the Inspection Reports for use of this

exclusion: dates when snow cover occurred, date when construction activities ceased, and date melting conditions began.

8.2.5 Precipitation Event Inspections

Active construction site inspections will be conducted within 24 hours after a precipitation or snowmelt event that causes surface erosion. If no construction activities will occur at the construction site following a storm event, post-storm event inspections will be conducted prior to re-commencing construction activities, but no later than 72 hours following the storm event.

9.0 EMPLOYEE TRAINING

PDC will inform and train employees who are involved with SWMP activities. Training will cover information and procedures contained in the SWMP and will be conducted on an as-needed basis. Personnel work responsibilities will be used to identify the appropriate attendees. Safety and environmental elements of the SWMP will also be covered. A Training Log (Appendix D) will be kept and updated on an annual basis.

The following topics may be presented and discussed during SWMP training:

- Introduction to the CDPS Stormwater Permit;
- Stormwater regulations;
- Purpose and requirements of stormwater permit;
- Components of the SWMP;
- Identification of potential pollutant sources;
- BMPs;
- Preventative maintenance;
- Good housekeeping;
- Inspections and maintenance; and
- Record keeping.

10.0 RECORD KEEPING

The following record keeping procedures will be implemented in order to provide accurate and complete documentation of events associated with the stormwater management program. Routine inspections will include the 14-day, monthly, and post precipitation event inspections. Stormwater related inspection records, site maps, and diagrams will be also kept on file or in the PDC database. All stormwater related records will be filed and stored by PDC for a minimum of three years after each individual site has achieved final stabilization

11.0 SWMP REVIEW/CHANGES

PDC will amend the SWMP whenever there is a significant change in design, construction, operation, or maintenance, which has a significant effect on the potential for the discharge of pollutants to water of the state, or if the SWMP proves to be ineffective in achieving the general objectives of controlling pollutants in stormwater discharges associated with pads, access roads, and pipeline construction activities. The SWMP is considered a “living document”.

FIGURE



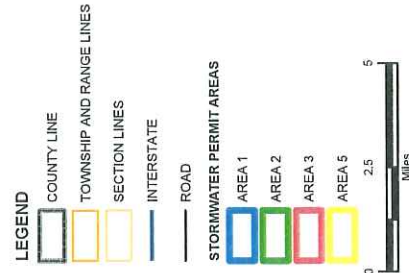
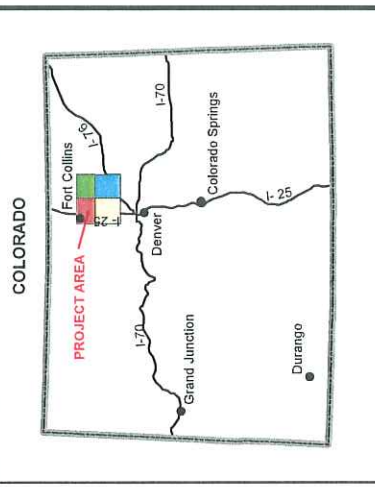
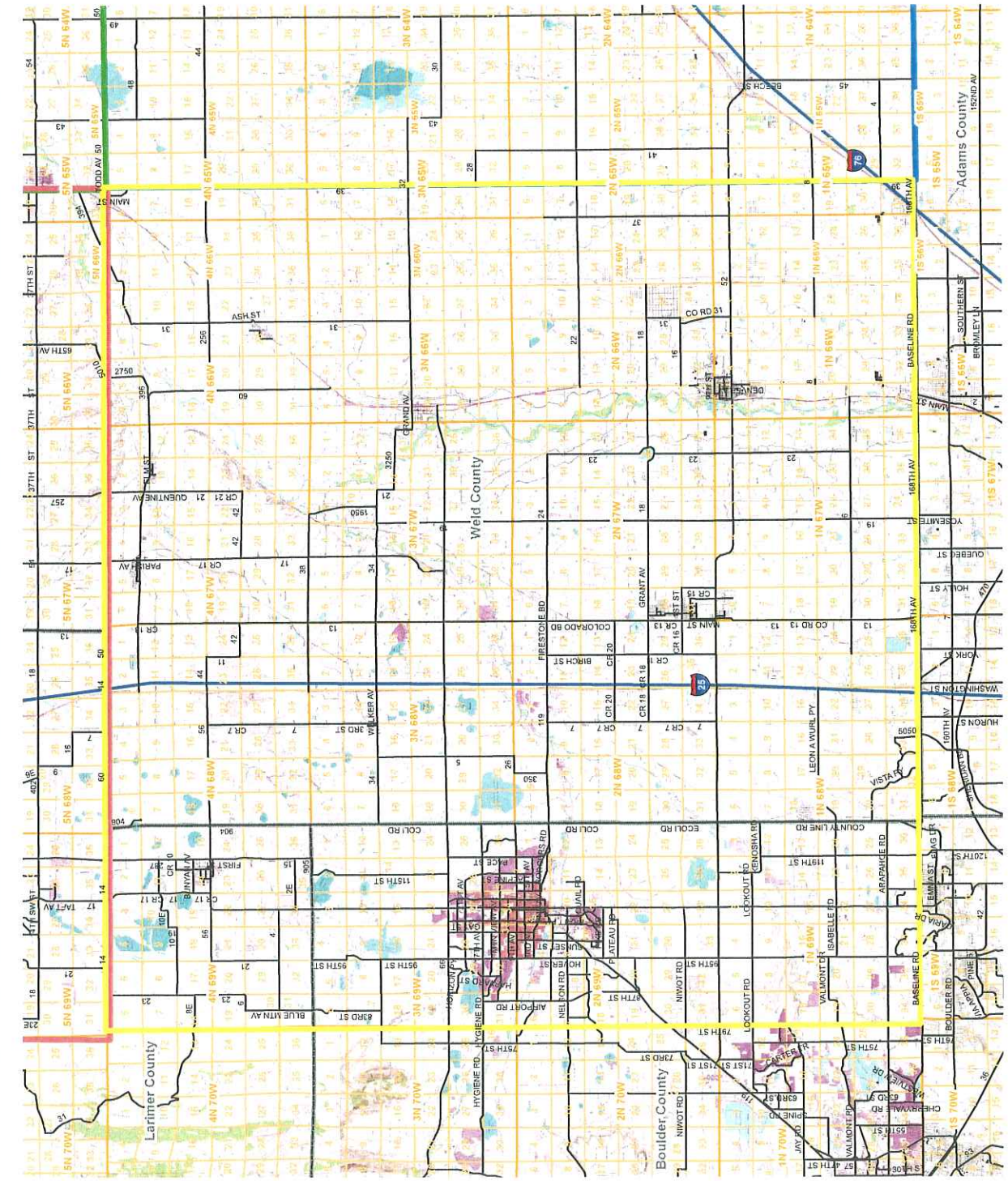


FIGURE 1
STORMWATER PERMIT AREA 5
BOULDER, LARIMER AND WELD COUNTIES,
COLORADO

PETROLEUM DEVELOPMENT CORPORATION

