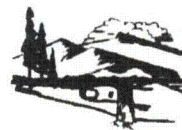




Matt Mead, Governor

Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.



John Corra, Director

June 13, 2011

Ms. Dawn Kolkman
Cameco Resources, Inc.
PO Box 1210
Glenrock, WY 82637

Subject: April 2011 Inspection Report, Cameco Resources, Permits 603 & 633

Dear Ms Kolkman:

Please find enclosed the above referenced report. The April inspection was conducted with assistance from your staff on April 20 and 21, 2011. The report includes several compliance issues which are recommended for enforcement actions. Further notice of the violations will be forthcoming.

If you have any questions, please do not hesitate to contact me at pam.rothwell@wyo.gov or 777-7048.

Sincerely,

Pam Rothwell
District 1 Assistant Supervisor
Land Quality Division

Enclosure

cc: Cameco Resources, Cheyenne, WY w/att
Douglas Mandeville, NRC w/att
Tom Foertsch, BLM-CFO w/att



**APRIL 2011 INSPECTION REPORT
DISTRICT 1/LAND QUALITY DIVISION**

COMPANY: Cameco Resources (CR), Highland Ranch, Permit #603
& Smith Ranch, Permit #633

LOCATION: North of Glenrock, off Ross Road

DATE OF INSPECTION: April 20 & April 21, 2011

DATE OF REPORT : April 22, 2011

REPORT WRITTEN BY: Julie Powell, LQD Project Engineer
Pam Rothwell, Permit Coordinator

INSPECTORS: Pam Rothwell, LQD Permit Coordinator
Julie Powell, LQD Project Engineer

CONDITIONS: Sunny to partly cloudy, 45°, high winds (35-55 mph)

CO. REPRESENTATIVES: Dawn Kolkman, SHEQ Manager
Joe Brister, SHEQ Director
Josh Leftwich, Director of Radiation Safety & Licensing
Dave Moody, Wellfield Superintendent
Tom Cannon, General Manager
Tom Young, Vice President, Operations
Jim Clay, Geochemist
Perry Herschberger, Drilling Supervisor
Craig Hiser, Wellfield Development Supervisor
Cory Griffiths, Satellite #2 Operator

OTHER AGENCY REPS: Tom Foertsch, Bureau of Land Management

INTRODUCTION

The focus of this inspection was to investigate a percentage of abandoned drill holes reported by Cameco Resources in the 2009-2010 Annual Report. Following the March 2011 inspection, LQD proposed to inspect approximately five percent of abandoned drill holes during the next four or five inspections of 2011. A list of thirty abandoned drill holes randomly selected from the 2009-2010 Annual Report was provided to CR prior to the inspection. LQD requested that the concrete caps remain undisturbed until the LQD investigation. The process of the investigation was to remove the surface soil cover, observe the concrete capping of the hole, and confirm that the hole is plugged two feet below the ground surface (§ 35-11-404 (c)(iii)). Additionally, LQD

requested that the plug and abandonment reports be available during this inspection for all holes reported in Table 10-1 of the Annual Reports for 2009-2010.

Other items included in the inspection:

- LQD asked for information regarding the well on excursion (CM-32), including the Guideline 8 results for the excursion well
- meet with the Satellite #2 Operator to verify the excursion well mitigation work
- inspection of erosion control measures and random leak detection equipment verification was also performed as part of LQD's on-going inspection efforts to verify compliance with State of Wyoming rules and regulations.

INSPECTION SUMMARY (April 20, 2011)

Pre-Inspection Meeting:

Tom Cannon, Joe Brister, Dave Moody, Josh Leftwich, Dawn Kolkman, Tom Young, Pam Rothwell and Julie Powell were in attendance. BLM representative Tom Foertsch arrived after the pre-inspection meeting to attend the inspection.

LQD informed CR representatives of the items to be completed during this inspection. This included inspecting drill holes, obtaining more information regarding the well on excursion, Guideline 8 results for the well on excursion, visiting Satellite #2 to verify the mitigation efforts for the well on excursion, obtaining water/selenium test results and general site inspection.

Mr. Cannon explained to the LQD that in January 2011 CR conducted an internal investigation of their drill hole abandonment process and have developed modifications to that process. CR had an evaluation of the abandonment process completed by third party mud engineers. Based on the evaluation, CR made modifications to include a waiting period of two weeks for the hole to settle before topping it off with plugging material. He stated further that the initial procedure of plugging drill holes resulted in some fall-back up to 100 feet. CR believes their modifications will correct this problem. LQD informed CR that the viscosity of their plugging material should be around 65. CR inquired where this is required in the regulations. The Noncoal Rules and Regulations, Chapter 8 were referenced. Further discussion concluded that the viscosity is not a prescriptive requirement, however, a comparable requirement is prescribed with the ten minute gel strength of at least 20 lbs/100 sq. ft as required in Chapter 8.

Field Inspection:

- MU-7 – Inspected holes #732, 793, 780, 704, 762, 2575 & 2521 (results are tabulated below in Table 1). Procedure for drill-hole inspection was to remove the soil cover with a backhoe or hand dig with a shovel, remove concrete cap, measure down to the plug with a 300' tape measure/probe, and replace concrete cap (**Figures 1-3**). None of the holes were in compliance with the two feet from surface requirement. Of the 20 holes inspected, 13 had the concrete plugs located and removed; 7 were not located. Of the 13 holes measured for depth to plug gel, all exceeded the required depth of two feet below surface. The depth varied from approximately 50 feet to 200 feet below surface. According to CR, they used a "plug gel"

consisting of bentonite, soda ash and a polymer “dris-pack” to plug these drill holes. One bag of plug gel was used per 100 feet of drill hole. The viscosity of the plug gel ranges from 62-67 according to CR. CR reports they consulted with mud engineers and the plug gel seeks the static water table level after the drill hole is filled; accounting for the plug depth. CR reports that the water table is 200-300 feet below surface throughout the mine operation. CR began using bentonite chips to top off any subsidence of the plug gel after allowing the plug gel to subside for two weeks beginning in January 2011 to correct the non-compliance issue; one bag of bentonite fills five feet of each drill hole.

- MU-3 – Inspected holes #2568, 2475, 2480 & 2559 using same process as above.
- MU-4 – Inspected holes #534 & 084. Note that the drill holes are listed as being located in MU-4 however they actually should be referred to as “on-permit” according to CR.
- Pam looked at a topsoil pile with Joe Brister with no erosion control around the pile. The location was near drill hole #2559 in MU-3. Joe indicated that CR believes there is no need for erosion control due to the stable slope on which the pile was placed. LQD’s concern is that topsoil protection is inconsistent; some stockpiles are protected with toe ditches or straw waddles, others have no protection.
- LQD requested to view the approved SOPs for the material used to plug the abandoned drill holes (specifically looking for mud weights). CR indicated they would allow LQD to view the SOPs however copies could not be made or taken from the premises as they are internal policies. CR also indicated that a company called Cecto makes the plug gel that they used to plug the drill holes and that a mud engineer tests the material once per year to make sure the mix complies with standards. Joe Brister reported that all CR SOPs are being revised this year. However the viscosity standard of 60 has not changed.
- Dave Moody provided additional information regarding the well on excursion (CM-32). He reported that the well is below the upper control limits, modifications have been implemented to well pumping patterns in MU-D, wells are pumping harder, the water table has been lowered, alkalinity is down a bit, and drift water is being pulled thru the field in a different direction. Dave indicated that CR will provide exact well numbers and a map indicating these changes for LQD and this information will be in an upcoming report.
- Satellite #2 – LQD met with the Satellite #2 Operator Cory Griffiths. He explained the modifications made to MU-D and indicated that DP 17 & 18 are pulling with the drift water and that a different restoration well was started today running at 14 gpm. MU-C was also discussed. Mr. Griffiths indicated that based on hand-held flow meter results in the header house, well CP 175 is running at 16 gpm and CP 169 is running between 17-18 gpm. These wells are being utilized to pull back the well on excursion. He also indicated that wells 20, 16, 15 and 17 are in RO and waste disposal is directed to the Vollman, Morton 120, and SHRUP 9 deep disposal wells with plans to start up additional disposal through PSR2 and the irrigator starting next month. Pam requested that the reported flows be verified with LQD at this time using a flow meter for the specified wells (**Figure 4**). Using a Halliburton DR-3 Rate Meter, flows were verified and results are tabulated in Table 2 below.

INSPECTION SUMMARY (April 21, 2011)

Pre-Inspection Meeting:

Dave Moody, Joe Brister, Dawn Kolkman, Josh Leftwich, Jim Clay, Pam Rothwell and Julie Powell were in attendance. Tasks for the day were outlined to include inspection of more wells, obtain the selenium test results, and Guideline 8 results.

Jim Clay, Cameco Geochemist, addressed the selenium issue. CR took a grab sample of water from the pond and sent to Energy Labs for selenium testing. A copy of the test result was provided to LQD. Jim discussed the difference between total vs. dissolved selenium and that the settlement agreement makes no distinction as to whether the allowable concentration is total or dissolved. Jim believes that the pond is the point of compliance and that CR has addressed the selenium issue stating that the water in the pond is clean. Additional documents and graphs were distributed to LQD by CR. However, LQD decided that further technical discussion was not needed at this time. Pam stated that LQD only requested lab data. Josh asked where LQD made the request for selenium data. Pam indicated this was formally requested in a previous inspection report. Jim asked if it is acceptable for CR to do selenium tests internally. Pam had no objection to CR continuing to evaluate the selenium levels internally. Pam's concerns are that CR has made a determination for the point of compliance without discussion with LQD. A reference to the Settlement Agreement is not necessarily conclusive that the selenium concerns are all satisfied. At this time LQD is only asking for the sampling reports for water discharging from the Selenium plant to the pond.

Pam requested to see the plug and abandonment reports showing the mud weight for all of the wells inspected during this visit. CR indicated they would provide this sometime next week.

Pam requested to view the drilling activity on the west end of the operations; appeared to be exploration drilling. CR indicated that the Casper Exploration Office is doing this work. Additionally, Pam requested to look at disturbance areas in MU-10.

Inspection:

MU-10: During the investigation of the first P&A drill site, LQD observed topsoil salvage and protection at a nearby drill site. The topsoil pile was located on a hillslope and there was no erosion control to protect the downslope side of the pile (**Figure 5a & 5b**). Soil was eroding from the stockpile onto a road leading to the drill site. In addition, sediment control was not installed around the disturbance area allowing sediment from the disturbance to wash onto native areas (**Figure 6**).

Several drill holes could not be located for the P&A inspection. CR requested that they be able to locate the wells ahead of time; they ordered a metal detector. LQD agreed that CR could locate and mark the sites however they should not excavate the soil cover without LQD being present.

Topsoil piles in and around active drilling operations were inspected in proposed Mine Unit 10. The topsoil piles were absent of any erosion control protection (ditches/berms, wattles, seeding) (**Figure 7**). The topsoil piles were located approximately 20 feet from the drill sites on all the wells observed in the development area (approximately 10-15 sites). It was apparent that the piles were not being combined into a larger pile serving the area of disturbance as was discussed with CR to mitigate previous topsoil compliance concerns. The drilling supervisor indicated that the topsoil piles were not completed yet and they will be adding to them or combining piles. He stated that the piles will be complete sometime next week and erosion control will be added. The stockpiles were not only unprotected but also had vehicle disturbance due to the wellfield activity (**Figure 8**).

It was noted that very little sediment control was installed throughout the entire mine unit disturbance (**Figures 9a & 9b**). Silt fence was noted in two shallow drainages in poor repair, filled with sediment (**Figures 10a & 10b**). As a result of the poor effort in controlling erosion, sediment was washing onto native, unstripped areas throughout the wellfield development area.

LQD requested to view the west side of the operations (west of MU-9) where disturbed areas were observed the previous day while completing drill-hole inspections. Upon inspection of these areas, it was found that drilling activities were not using sediment control, topsoil protection measures, controlling drilling fluid from entering drainages or ensuring stable slopes following the drilling activity (**Figures 11a, 11b, 11c, and 11d**).

In the same area of the drill holes inspected in Figures 10 and 11 above, an open drill hole was discovered. With the drilling activity in the general proximity (approximately 50-75 feet from those drill sites). This hole was easily found, yet no effort was made to cap or plug the hole (**Figure 12**).

Header House 9-13 was inspected with production and injection in progress. The inspection sheet was updated and current. A random leak detection at a well was inspected near the header house and also appeared to be in working order.

The temporary reclamation in Mine Unit 9 near header house 9-11 was thoroughly inspected. Erosion control measures are in place including silt fence and straw wattles. The drill seeding that occurred in fall 2010 was crimp mulched with straw. There was very early indication of seed germination. A large stack of straw blankets was staged in the middle of the reclaimed wellfield and CR reports these will be installed this summer (**Figure 13**).

The natural drainage near header house 9-6 was inspected. This area was temporarily reclaimed two years ago and slope stabilization is in place as well as erosion control. Silt fencing is full of sediment and is over-topping. CR reports this will be cleaned out. A random leak detection unit (P102) was inspected and appears to be in working order.

Drainage work around SR-2 was inspected. Rip-rap, terracing, straw wattles and vegetation is in place. Sediment is accumulating near the top of the slope near the road which appears to be coming from the road. The lower slopes appear stable with little additional accumulation of sediment (**Figure 14**).

RESULTS

TABLE 1 – Plug & Abandonment Investigation Summary

Mine Unit	Hole Delineation Number	Completion Date	Surface Cap	Depth to Plug
MU-3	3674-26-2475	11/12/09	OK	137'
MU-3	3674-26-2480	12/17/09	OK	104'
MU-3	3674-26-2559	1/19/10	OK	87'
MU-3	3674-26-2568	1/22/10	OK	126'
MU-4 (on-permit)	3574-2-534	9/1/09	OK	63'
MU-4 (on-permit)	3574-3-084	10/22/09	OK	46'
MU-7	3674-26-2521	1/11/10	OK	99'
MU-7	3674-26-2575	3/10/10	OK	98'
MU-7	3674-27-704	1/15/10	OK	185-200'
MU-7	3674-27-732	3/16/10	Not found	
MU-7	3674-27-762	2/24/10	Not found	
MU-7	3674-27-780	2/19/10	OK	167'
MU-7	3674-27-793	3/3/10	OK	145'
MU-10	3574-16-380	10/22/09	Not found	
MU-10	3574-16-404	10/16/09	Not found	
MU-10	3574-17-1004	11/6/09	OK	196'
MU-10	3574-17-1019	11/10/09	Not found	
MU-10	3574-17-1043	11/14/09	Not found	
MU-10	3574-18-1002	11/10/09	OK	94'
MU-10	3574-19-207	12/17/09	Not found	

TABLE 2 - MU-C Well Flows

Header House	Well	Flow
C-24	CP-175	16.1 gpm
C-22	CP-169	17.4 gpm

COMPLIANCE ASSESSMENT

- 1 The abandoned drill holes inspected for the depth to the seal (drilling mud) were found to be at significant depths below surface varying from 46 to 198 feet below surface. CR states that the drill mud although filled to the top of the hole settles back to the static water level. During the investigation, groundwater was only encountered in two holes and it was questionable whether or not the water was associated with an aquifer or with the drill mud.

If this is the case, the depth to the shallow aquifer is erratic. Within **Mine Unit 3** four drill holes were explored and found to have drill mud at depths ranging from 87 to 137 feet; a **50 foot change in depth across several hundred feet horizontal distance**. Within **Mine Unit 7** the depth to drill mud ranged from 98 feet to 185 feet below surface; an **87 foot change in depths across several hundred feet horizontal distance**. Similarly, in **Mine Unit 10**, the depth to drill mud ranged from 94 feet to 196 feet below surface; a **102 foot change in depths across several hundred feet horizontal distance**. If these depths to the drilling mud represent the fall back to shallow groundwater depths, the groundwater gradients are extremely steep and irregular across the permit.

It is not likely that the depths to drill mud correlate to the depths to groundwater. There are other variables contributing to the fall back distance including the mud weight used to plug the holes and whether or not the mud was circulated in the hole from bottom to top.

In an evaluation of the Uncased Well Abandonment reports, it becomes apparent that there are inconsistencies or incorrect information. By was conducted by the LQD staff. As a result of the evaluation several issues are noted as problematic:

- There are three instances where the information provided on the Uncased Well Abandonment reports; it becomes apparent that there are inconsistencies or incorrect information. By is incomplete or possibly illegible.
- For all Uncased Well Abandonment reports, it becomes apparent that there are inconsistencies or incorrect information. By, there is no indication of the specific type and manner of preparing the plugging materials. LQD attempted to perform calculations in order to determine the volume of plugging material used in each hole. However, without the specific material information, it is impossible to make any calculations and evaluate the information regarding viscosity.
- Drill Hole #3674-26-2559: The drill bit size (diameter) of the hole appears to be 5-7/8". However, this is a diameter not referenced on any other drill holes throughout the mine. The vast majority of drill holes at the Smith-Highland Ranch are 5-5/8". This appears to be a case of illegible hand-writing by the plugging operator. The reports need to be complete and legible, otherwise they are useless for purposes of compliance analysis.

- Drill Hole #3674-23-1: The number of bags of plugging material used is left blank for this 8-3/4" hole on this report. The information provided on the report is incomplete and yet a geologist for the company signed the form. Without providing all the information on the drill report there is no method of correlating data and determining compliance with regulations.
- When comparing the data provided on the Uncased Well Abandonment reports, it becomes apparent that there are inconsistencies or incorrect information. By grouping similar depths of drill holes, the number of bags of plugging material does not make sense. There is a wide range of bags used for similar hole sizes and the same number of bags with the same viscosities reported to be used to fill holes with one-hundred (100) feet difference in hole depth. The following table represents information provided by Cameco and grouped to demonstrate the inconsistencies:

Hole Number	Depth (ft)	Bags (ea)	Viscosity (sec)
3673-19-996	880	11	71
3674-24-469	880	7	75
3674-26-2521	880	12	70
3673-19-986	900	18	80
3674-24-451	900	10	72
3574-19-207	920	12	85
3674-27-780	920	12	64
3674-27-704	940	12	80
3574-18-1002	940	14	70
3574-17-1004	960	10	67
3674-26-2575	960	12	62
3674-27-780	960	12	75
3574-16-404	980	10	65
3674-27-732	980	12	70
3574-8-349	1000	20	87
3574-17-1019	1000	12	75
3674-24-481	1000	10	68
3674-27-793	1000	12	73

Table 1 Comparison of Same Size Drill Holes (All Holes are 5-5/8" Diameter)

In summary the inconsistencies include:

- ❖ The drill holes with depth of 880 feet, seven to twelve bags with very similar viscosities are reported to be used to fill the holes. A variation of five bags of plugging material to fill the same sized hole is not logical.

- ❖ The drill holes with a depth of 900 feet, ten to eighteen bags with a relatively small deviation of viscosity are reported to be used to fill the holes. A variation of eight bags to fill the same size hole is again not logical.
- ❖ The drill holes with a depth of 920 feet, the same number of bags are used to fill the hole. However, the viscosity of this material ranges from 64 seconds to 85 seconds. The variation in viscosity is too large to require the same number of bags to fill the same size hole.
- ❖ The drill holes with a depth of 1000 feet, ten to twenty bags are reported to be used to fill the holes. A variation of ten bags to fill the same size hole is not logical.
- ❖ Twelve bags at a viscosity of 70 seconds are reported to be used to fill two very different size holes; 880 feet and 980 feet. The exact same material being used to fill holes varying in depth of one-hundred (100) feet is not logical.

The Wyoming Environmental Quality Act (WEQA) § 35-11-404 (b)(ii) defines "Sealing" of drill holes as follows: *"Drill holes which have encountered any ground water shall be sealed by leaving a column of drilling mud in the hole or by such other sealing procedure which is adequate to prevent fluid communication between aquifers"*

There is a strong indication that the drilling mud used at CR is not of sufficient mud weight to sufficiently seal the drill holes. The drilling mud is falling back to significant depths below surface indicating the fluid is either going into the rock formations and/or groundwater at depths below the top of the drill fluid column. The fluid could be seeping out of the drill column at any elevation in the column, and there is no way to know where in the column it could be occurring. There is also potential that with the drill fluid seeping into multiple zones throughout the drill column that it is resulting in communication between aquifers. Finally, many of the inspected drill holes are located close to existing wellfields which may be developed into production areas. With a potentially low mud weight there is a chance that the drill mud in these holes will continue to flow into multiple aquifer zones as a result of pumping in the wellfields.

The LQD concludes that with the lack of conclusive plugging records to verify the mud weights are sufficient to seal the drill holes and the evidence of substantial loss of fluid to the formations/aquifers below the top of the drilling mud column, CR is in violation of WEQA § 35-11-404(c)(ii) and therefore, enforcement action is recommended.

- 2 An open drill hole was discovered by the inspectors and subsequently confirmed to have been drilled by a previous operator for the Smith Ranch mining operations. Regardless of the timeframe of the drilling activity, open drill holes on the permit or associated with the

exploration activities of the permit are the responsibility of the operator. The open hole is a violation of WEQA § 35-11-404(c) and enforcement action is recommended.

- 3 Significant deficiency in sediment and erosion control continues to be a very high concern for LQD at the SHRUP mine sites. The lack of sediment control in the Mine Unit 10 development areas and the lack of sediment controls associated with exploration/delineation drilling activities on and/or adjacent to the permit boundaries are a repeat violation that LQD has tried to impress upon the operator as a serious problem. The inspectors have encountered numerous instances of sediment on native areas as a result of mining related disturbances. According to the WEQA, § 35-11-415 (b)(viii), *"The operator...shall...prevent, throughout the mining and reclamation operation...the pollution of surface and subsurface waters on the lands affected..."* and according to the Wyoming Land Quality Division Noncoal Rules and Regulations (R&R), Chapter 3, Section 2(c)(i)(A), *"All topsoil or approved surface material shall be removed from all areas to be affected in the permit area prior to these areas being disturbed..."*. The disturbance in Mine Unit 10 does not include adequate sediment control with significant sediment being deposited on native areas. Also, the exploration/delineation drill sites associated with CR's drilling activities in the southwest area of the permit does not include adequate sediment control resulting in sediment and drilling mud depositing on native areas. Therefore, enforcement action is recommended.
- 4 Salvaged topsoil stockpiles continue to be poorly protected in areas of active drilling operations. The instances noted during the inspection include topsoil stockpiles located on slopes without tow ditches or berms to contain the soil in the stockpile on the downslopes sides of the piles. These instances resulted in loss of soil to the downslope disturbed areas. Failure to protect topsoil is a violation of WEQA, § 35-11-406 (b)(viii). Therefore, enforcement action is recommended.
- 5 The Uncased Well Abandonment records are not completed accurately with a high degree of variability with the number of sacks of Plug Gel used to obtain the reported viscosities. The analysis of the depth to drilling fluid in the inspected drill holes reveals that the records cannot be accurate based on the wide variability of mud subsidence in the holes. The records are not verifiable. False representation or certification of any report is a violation of WEQA § 35-11-901(k). Therefore, enforcement action is recommended.

PHOTOS



Figure 1 – Abandoned drill-hole inspection; digging to locate the drill cap



Figure 2 – Measuring depth to plug gel



Figure 3 – Concrete cap from Well #732



Figure 4 – Flow Meter Verification at header house



Figure 5a Drill site; unprotected topsoil pile

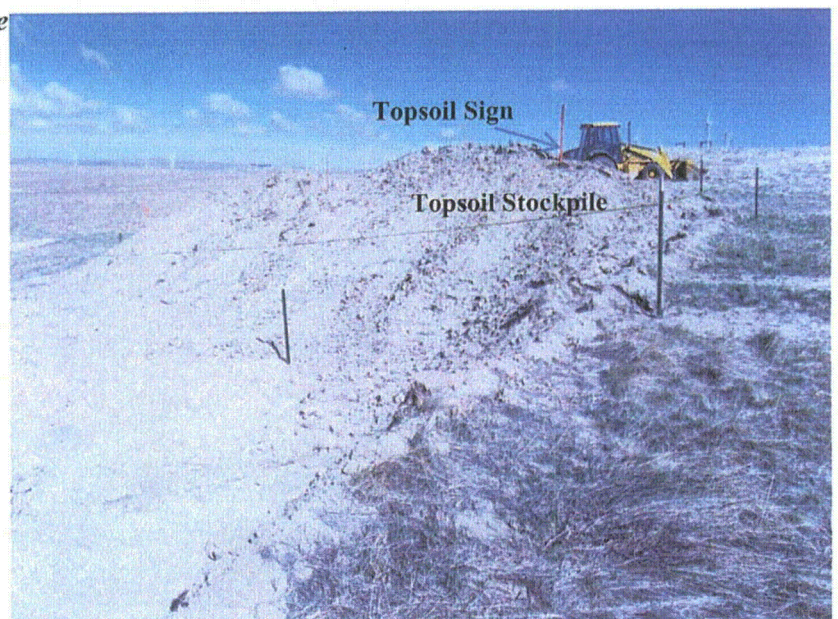


Figure 5b Drill site; unprotected topsoil pile

Figures 5a and 5b – Topsoil stockpile on slope above access road to well, not protected on downslope side; topsoil loss on road



Figure 6 Drill site without sediment control resulting in sediment on native ground



Figure 7 Topsoil pile in MU10 without erosion control



Figure 8 Topsoil pile in MU-10 without erosion control or protection from mine disturbances



Figure 9a *Disturbance area on slope without sediment control*



Figure 9b *Disturbance in drainage without sediment control*

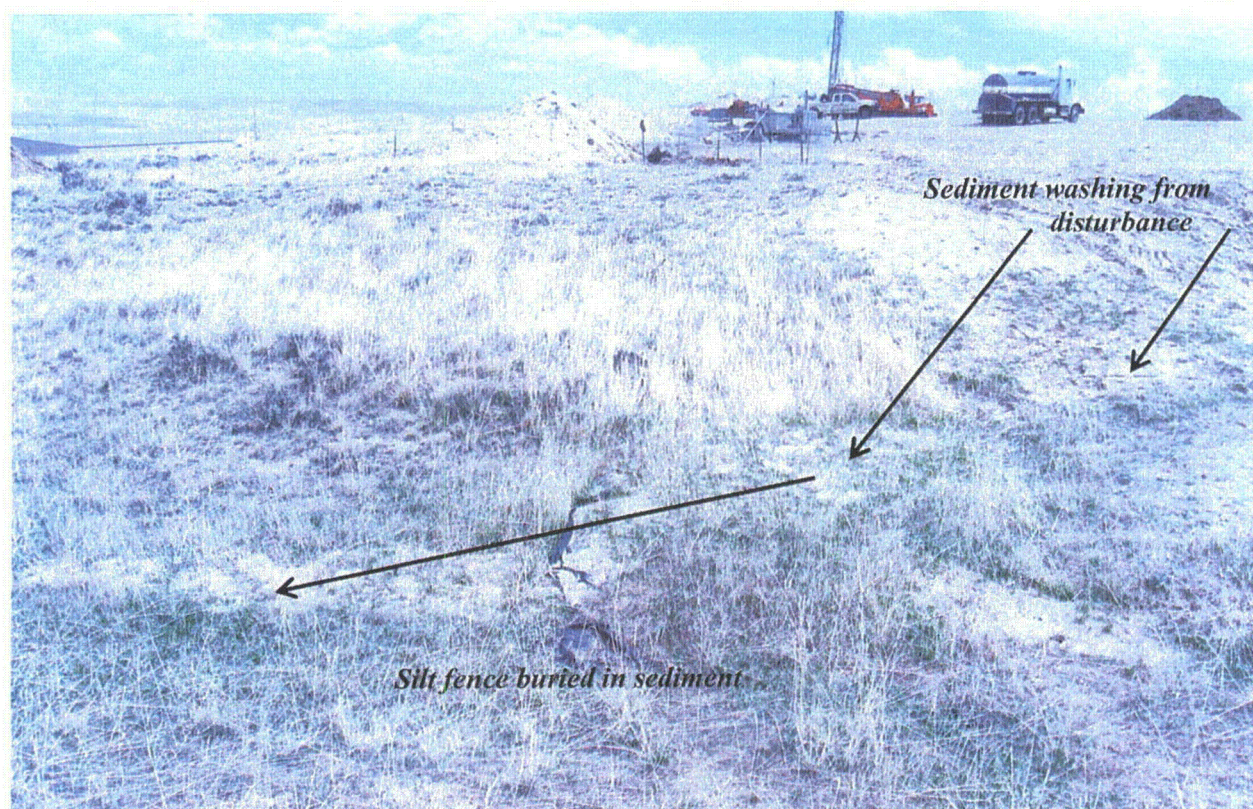


Figure 10a *Silt fence poorly maintained and not effective in controlling sediment in MU-10*



Figure 10b *Poorly maintained silt fence in MU-10*

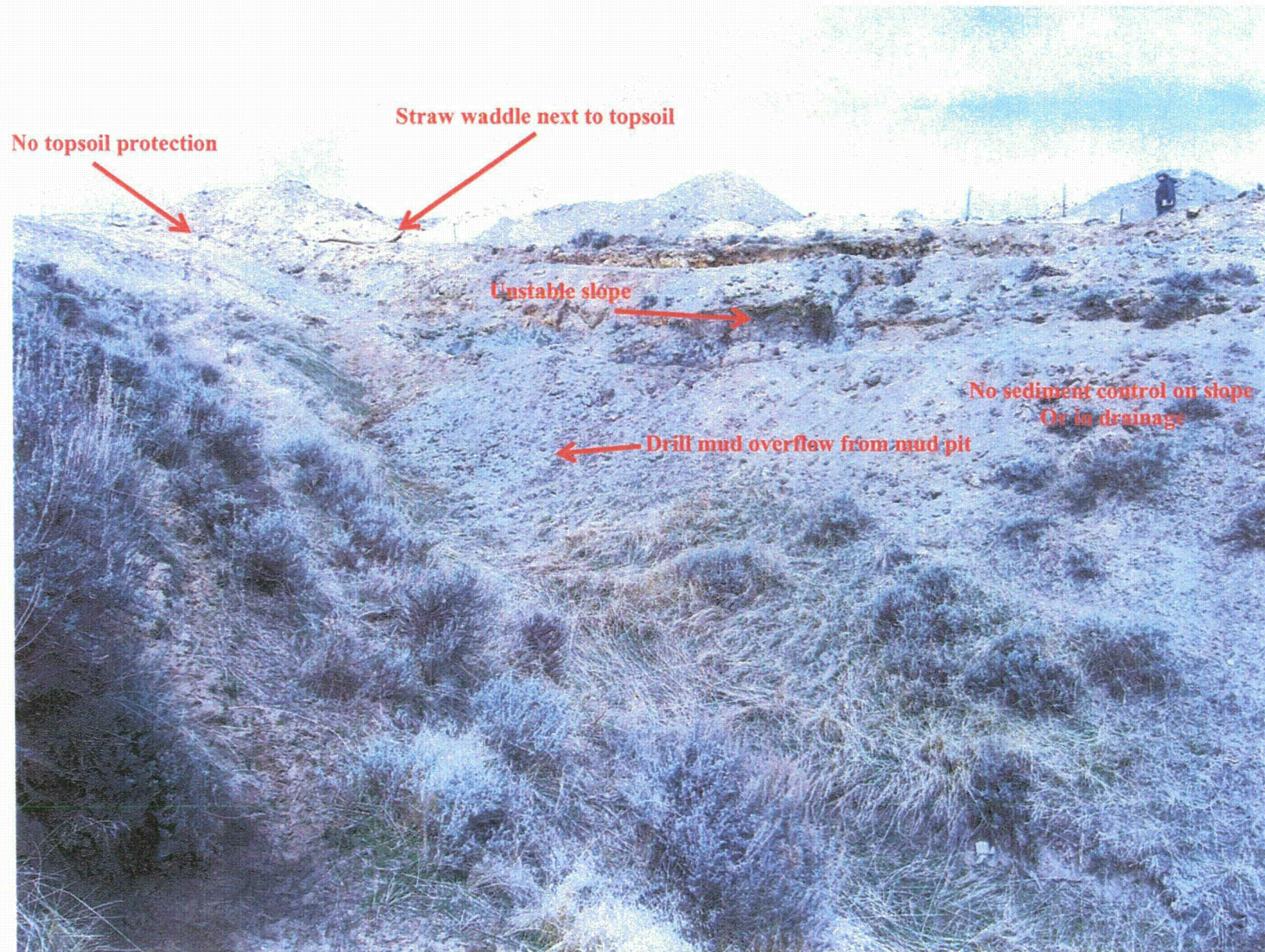


Figure 11a Drill site on slope; drill mud spilled onto native, unstable drill pad, lack of sediment control in drianage, lack of topsoil protection



Figure 11b – Drilling mud in drainage approximately 50 feet downslope from the drill site in Figure 11a



Figure 11c Disturbance from another drill site with no sediment control used on the slope



Figure 11d Sediment and drill mud in drainage below the disturbance in photo 11c



Figure 12 – Open abandoned drill-hole



*Figure 13 MU-9 temporary revegetation is completed in the wellfield (fall 2010).
Sediment control is in place around the perimeter of the reclamation to protect the native areas*



Fig. 14— Slope stabilization and erosion control next to road near SR-2