



# Department of Environmental Quality



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

Matthew H. Mead, Governor

Todd Parfitt, Director

October 15, 2014

Anadarko Petroleum Company  
Mr. Harry Nagel, Minerals Manager  
1201 Lake Robbins Drive,  
The Woodlands, TX 77380

RE: Groundwater Classification, Bear Creek Uranium Company, Converse County, WY

Dear Mr. Nagel,

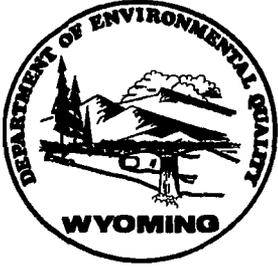
Enclosed, please find the Wyoming Department of Environmental Quality, Water Quality Division, Groundwater Section review of the groundwater classification of the Upper Wasatch formation underlying the Bear Creek Uranium facility in Converse County, Wyoming.

If you have any questions, please contact me directly at (307) 675-5640 or via email at [Don.Fischer@wyo.gov](mailto:Don.Fischer@wyo.gov).

Sincerely,

Don Fischer, PG  
North District Geologic Supervisor  
WDEQ/Groundwater Section





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**GROUNDWATER POLLUTION CONTROL PROGRAM  
OFFICIAL GROUNDWATER CLASSIFICATION**

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY  
WATER QUALITY DIVISION  
2100 West 5<sup>th</sup> Street  
Sheridan, WY 82801  
Phone: 307-673-9337

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Facility Name: Bear Creek Uranium Company

Applicant: Anadarko Petroleum Company,  
1201 Lake Robbins Drive,  
The Woodlands, TX 77380  
Attn: Mr. Harry Nagel, Minerals Manager  
(832) 636.2732

Location: Section 9, 16, Township 38 North, Range 73 West

County: Converse County, WY

Type of Facility: Uranium Mill

Reason for Classification: Classification needed to determine aquifer restoration standards

Formation Containing Aquifer: Upper Wasatch

Consultant: N/A

Water Quality Division Permit Number: N/A (Land Quality Division Permit)

Report Received: 2/24/2014 (in Lander Office)

Reviewing Official: Don Fischer, PG 2852, North District Geologic Supervisor, Sheridan 

Date of This Review: 10/9/2014

Action: Groundwater Classified by Ambient Quality as **Class IV (Industrial)** (details below)  
K-Sand and N-Sand, Upper Wasatch Formation to 160 feet

## Information Required/Information Submitted

- (a) **Classification of groundwaters of the State shall be based on the water quality standards of this chapter; excepting a Class I groundwater of the State shall be classified by ambient water quality and the technical practicability and economic reasonableness of treating ambient water quality to meet use suitability standards.**
- (b) **Underground water quality shall be classified for an aquifer which is, or may be, affected by a subsurface discharge or other activity identified in Section 4(a) of these regulations.**

The Bear Creek Uranium Company tailing disposal reservoir (WY SEO permit #P7707) commenced operation in September, 1977. The request for groundwater classification falls within Sections 9 & 16, Township 38 North, Range 73 West, Converse County, Wyoming. Bear Creek Uranium is seeking groundwater classification for the upper Wasatch formation, referred to as the K-sand and N-sand, to a depth of 160 feet.

- (c) **Classification shall be made:**
  - (1) **Whenever there is pollution or threat of pollution to groundwater of the State, or;**
  - (2) **The physical, chemical, radiological or biological properties of any groundwater of the State are, or may be, altered by man's action.**

Uranium mining activities at this impoundment has the potential to impact groundwater in the area beneath and adjacent to the pond. Groundwater is classified for restoration purposes.

- (d) **Classification shall be made for a water in a specified locally defined area by named and described aquifer or receiver. Any aquifer or receiver in its regional setting may have one or more classifications by defined area or areas.**
  - (1) **The name shall be a recognized geologic name whenever possible, and;**
  - (2) **The description shall include a lithologic description.**

Pre-operation studies established that groundwater was present in two zones, the upper and lower Wasatch in Sections 9 and 16, T 38N, R 73W. The upper Wasatch, which contains the "K-sand" and "N-sand", are the zones that may be affected by drainage from the reservoir. The upper Wasatch contains interbedded sands, silts, and clays. The deposition was caused by large braided streams caused by the uplift of the Laramie Mountain range.

The lower Wasatch or "ore zone" should not be impacted. The upper and lower Wasatch formations are separated by a seam of low grade coal or lignite and a 40 to 100 feet thick siltstone/claystone unit. Analyses of groundwater samples taken from the upper and lower Wasatch demonstrates different water chemistries, indicating a lack of mixing between the two aquifers.

- (e) **The lateral and vertical limits of an aquifer or receiver, for purposes of classification, shall be based on existing water use, ambient water quality and geologic and hydrogeologic characteristics of the aquifer or of the receiver.**

There are no existing up-gradient or lateral gradient water supply wells adjacent to the facility and completed in the upper Wasatch. The only permitted wells within one mile of the facility are monitor wells downgradient of the facility. There are no permitted domestic use wells within two miles of the facility.

The groundwater at the Bear Creek is based on ambient quality. Prior to Bear Creek becoming operational, wells were sampled to establish ambient water quality for classification purposes by the Colorado School of Mines Research Institute. Well P9000, completed in the Upper Wasatch in Sec 16, T 38N, R 73W revealed that many of the parameters fall within a Class III groundwater classification. (e.g., TDS= 2638 mg/L, gross alpha concentration = 14 pCi/L, sulfate = 1635 mg/L). However, mercury at 0.0001 mg/L exceeds the class III limit of 0.00005 mg/L, **therefore, the groundwater classification is Class IV (industrial use).**

Well P19942, completed into the Upper Wasatch in Sec 34, T 38N, R 73W had sulfate levels exceeding Class II groundwater standards and mercury exceeding Class III groundwater standards. **Therefore, the groundwater from Well 19942 is classified as a Class IV (industrial use) groundwater.**

- (f) **An underground water may be re-classified if new or additional data warrant re-classification.**

**END OF REVIEW**