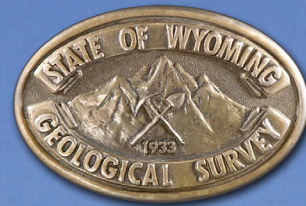




Wyoming State Geological Survey
Thomas A. Drean, Director and State Geologist



**Wind/Bighorn River Basin Water Plan Update
Groundwater Study
Level I (2008–2011)**

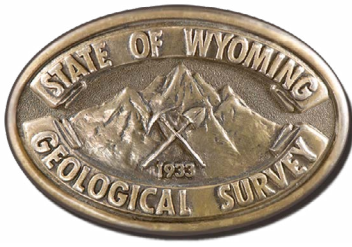
**Available Groundwater Determination
Technical Memorandum**

by

Paul Taucher, Timothy T. Bartos, Keith E. Clarey, Scott A. Quillinan, Laura L. Hallberg, Melanie L. Clark, Melissa Thompson, Nikolaus Gribb, Brett Worman, and Tomas Gracias

Prepared for the Wyoming Water Development Commission

**Laramie, Wyoming
2012**



Director and State Geologist Thomas A. Drea



**Design and layout by:
Chamois L. Andersen**

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This publication is also available online at:
<http://waterplan.state.wy.us/plan/bighorn/bighorn-plan.html>

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Cover: Outcrop of Triassic Chugwater Formation on Red Gulch Road southeast of Shell, on the eastern flank of the Bighorn Basin. Composed primarily of red siltstone and shale of the Red Peak Shale Member. Outcrop is capped by the thin limestone of the Alcova Limestone Member. Crow Mountain Sandstone Member can serve as reservoir rock where present. Photo by Alan J. Ver Ploeg (2005).

Available Groundwater Determination

Technical Memorandum

WWDC Wind/Bighorn River Basin Water Plan Update –
Groundwater Study
Level I (2008–2011)

Paul Taucher,⁴ Timothy T. Bartos,² Keith E. Clarey,³ Scott A. Quillinan,¹ Laura L. Hallberg,² Melanie L. Clark,² Melissa Thompson,¹ Nikolaus Gribb,¹ Brett Worman,¹ and Tomas Gracias¹

David Copeland,¹ Editor

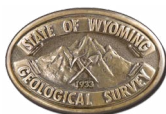
This report was prepared under contract for the Wyoming Water Development Commission (WWDC)³ by the Wyoming State Geological Survey (WSGS),¹ United States Geological Survey (USGS),² and Water Resources Data System (WRDS), in cooperation with the Wyoming State Engineer's Office (WSEO) and the Wyoming Oil and Gas Conservation Commission (WOGCC). Note: This electronic version, created on October 3, 2012, has been modified since the publication's original printing.

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List of Acronyms

AMCL	alternative MCL
AML	abandoned mine land
AMLE	adjusted maximum likelihood estimation
ANC	acid-neutralizing capacity
AYV	Absaroka and Yellowstone Volcanic Area
BAG	Basin Advisory Group
BCGS	basin-centered gas system
BHB	Bighorn Basin
BIA	Bureau of Indian Affairs
BUREC	U.S. Bureau of Reclamation
CAFO	concentrated animal feeding operation [feedlot]
CBNG	coalbed natural gas
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency (U.S.)
ET	evapotranspiration
FS	Forest Service (U.S.)
GIS	geographic information system
GPS	global positioning system
HAL	health advisory level
ICP	independent cleanup process
LQD	Land Quality Division (WDEQ)
MBMG	Montana Bureau of Mines and Geology
MCL	maximum contaminant level
MDL	multiple detection limit
MGIC	Montana Geographic Information Clearinghouse
NPDES	National Pollutant Discharge Elimination System (USEPA)
NWIS	National Water Information System (USGS)
PLSS	Public Land Survey System
POTW	public owned treatment works
PWD	Produced Waters Database (USGS)
RCRA	Resource Conservation and Recovery Act
RMLB	Rocky Mountain Laramide basin
R/P	recharge/precipitation ratio; recharge fraction (of precipitation)
SAR	sodium-adsorption ratio
SC	Statement of Completion
SDVC	Spatial Data and Visualization Center (UW – now WyGISC)
SDWA	Safe Drinking Water Act
SHWD	Solid and Hazardous Waste Division (WDEQ)
SMCL	secondary maximum contaminant level
SWAP	Source Water Assessment Program
TDS	total dissolved solids
TSD	treatment storage and disposal
UCG	underground coal gasification
UIC	underground injection control
USBLM	U.S. Bureau of Land Management

USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UW	University of Wyoming
VRP	Volunteer Remediation Program
WBRB	Wind/Bighorn River Basin
WDA	Wyoming Department of Agriculture
WDEQ	Wyoming Department of Environmental Quality
WOGCC	Wyoming Oil & Gas Conservation Commission
WQD	Water Quality Division (WDEQ)
WRB	Wind River Basin
WRDS	Water Resources Data System (University of Wyoming)
WRRI	Water Resources Research Institute (University of Wyoming)
WSEO	Wyoming State Engineer's Office
WSGS	Wyoming State Geological Survey
WWDC	Wyoming Water Development Commission
WWDO	Wyoming Water Development Office
WyGISC	Wyoming Geographical Information Science Center (UW – was SDVC)
WYPDES	Wyoming Pollutant Discharge Elimination System