POWERTECH (USA) INC.

DEWEY-BURDOCK
POWERTECH (USA) INC. URANIUM PROJECT

Uranium Mining in the Edgemont District

Rapid City Common Council

Mark Hollenbeck – Project Manager

- Dewey Native
- Organic Rancher
- B.S. Chemical Engineering – SDSM&T
- Former Mayor of Edgemont
- Former SD State Legislator
- Background in Energy and Engineering Management
- Licensed Professional Engineer

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Mark Hollenbeck
Dewey Native & Organic Rancher

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Presentation Overview

- What is Uranium
- History of Uranium Mining in SD
- *In Situ* Recovery (ISR) Process
- Dewey–Burdock Project
- Regulatory Status
- Economic Benefits

What is Uranium?

- Naturally occurring radioactive element
- Part of Earth's formation 4.5 billion years ago
- Fairly common element in Earth's crust, groundwater & seawater
- As common as tin, tungsten, molybdenum
- A square mile of earth (640 acres), one foot deep, will typically contain about 4 tons of uranium

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Uranium in Our Food & Water

Food and water contain uranium

- We eat about 1-2 micrograms of natural uranium every day – amount depends on source
- We drink about 1.5 micrograms of natural uranium for every liter of water we drink – amount depends on source

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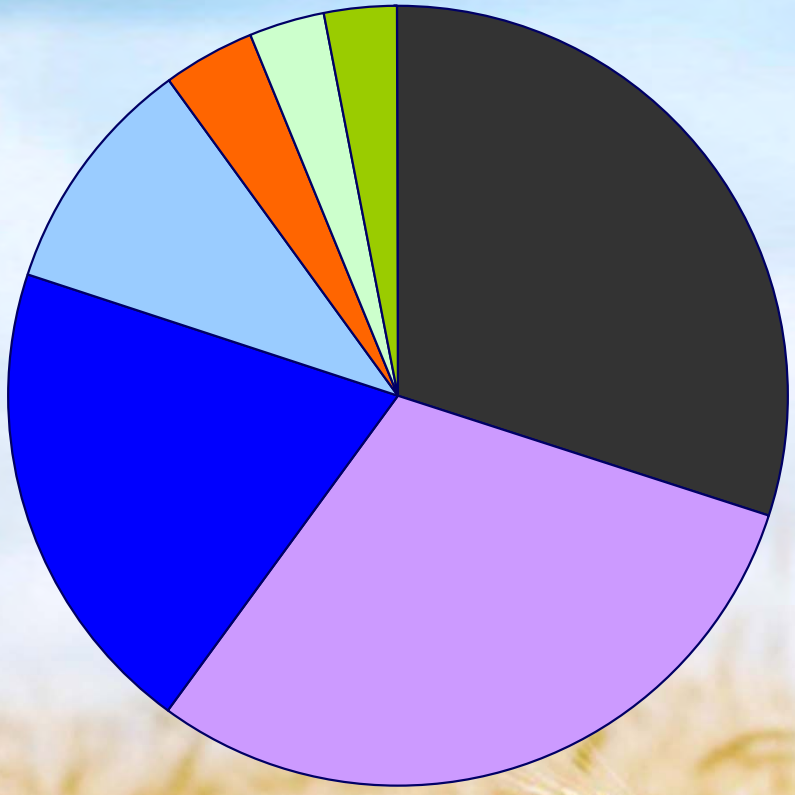
What causes Cancer?

Radiation is not a big hitter!!!

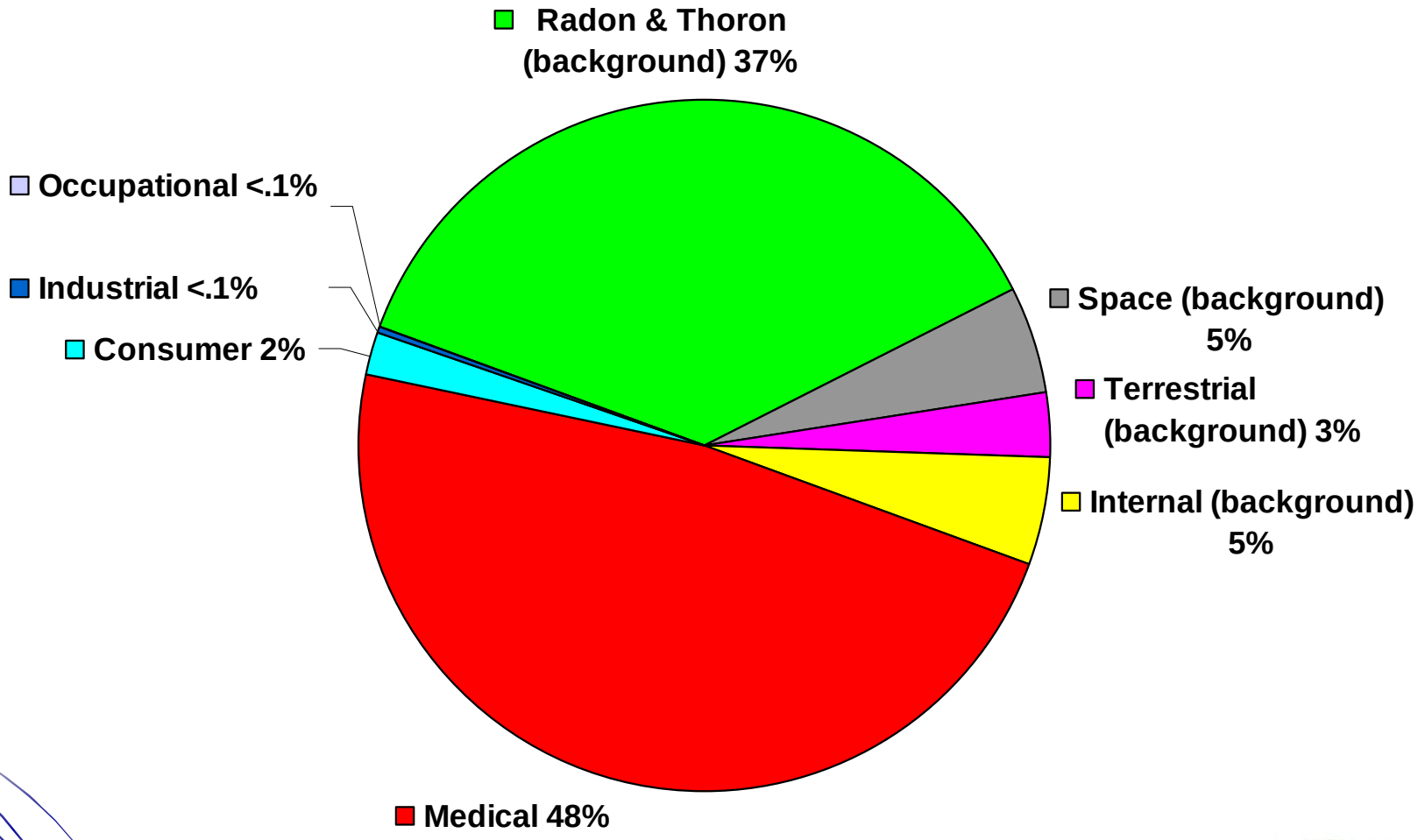


- Cigarette smoke
- Diet & nutrition
- Chronic infection
- Occupational exposure
- Genetic
- Alcohol drinking
- Environmental factors including radiation

WHO

Sources of Ionizing Radiation

Collective effective dose as a percentage for all exposure categories in 2006



Source: NCRP report no. 160 (1).
Schauer D A , Linton O W Radiology 2009;253:293-296

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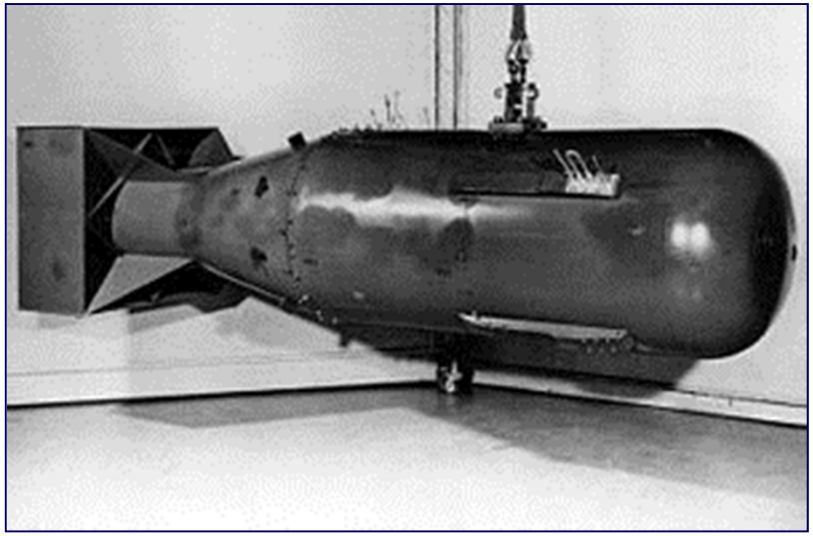
Long Term Impacts of Contamination

The worst case
surface soil radionuclide contamination scenario
is a near ground burst of the item below



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Immediate Effects

The immediate effects are somewhat bleak

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Later, however…

…a metropolis blossoms

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Uses of Uranium & Byproducts

- Nuclear power
  - 20% of U.S. electricity
  - 104 operating plants
- Medical isotopes
  - Diagnostics
  - Therapies
- Smoke detectors
- Luminous watch dials
- Military armor and armament
- Counterweights on ships & aircraft

Prairie Island, Minnesota

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Uranium
The Planet's Most Powerful Energy Source

- 2 million times more powerful than chemical energy (coal, natural gas)
- Small footprint
- No carbon dioxide emissions
- No emissions regulated by Clean Air Act
- Domestically supplied

One uranium fuel pellet –
the size of the tip of your little finger

= 149 gallons of oil

= 1,780 pounds of coal

= 17,000 cubic feet of natural gas

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Uranium
A Very Dense Source of Energy

It takes 75 train cars of coal
to equal the energy produced from
one drum of yellowcake

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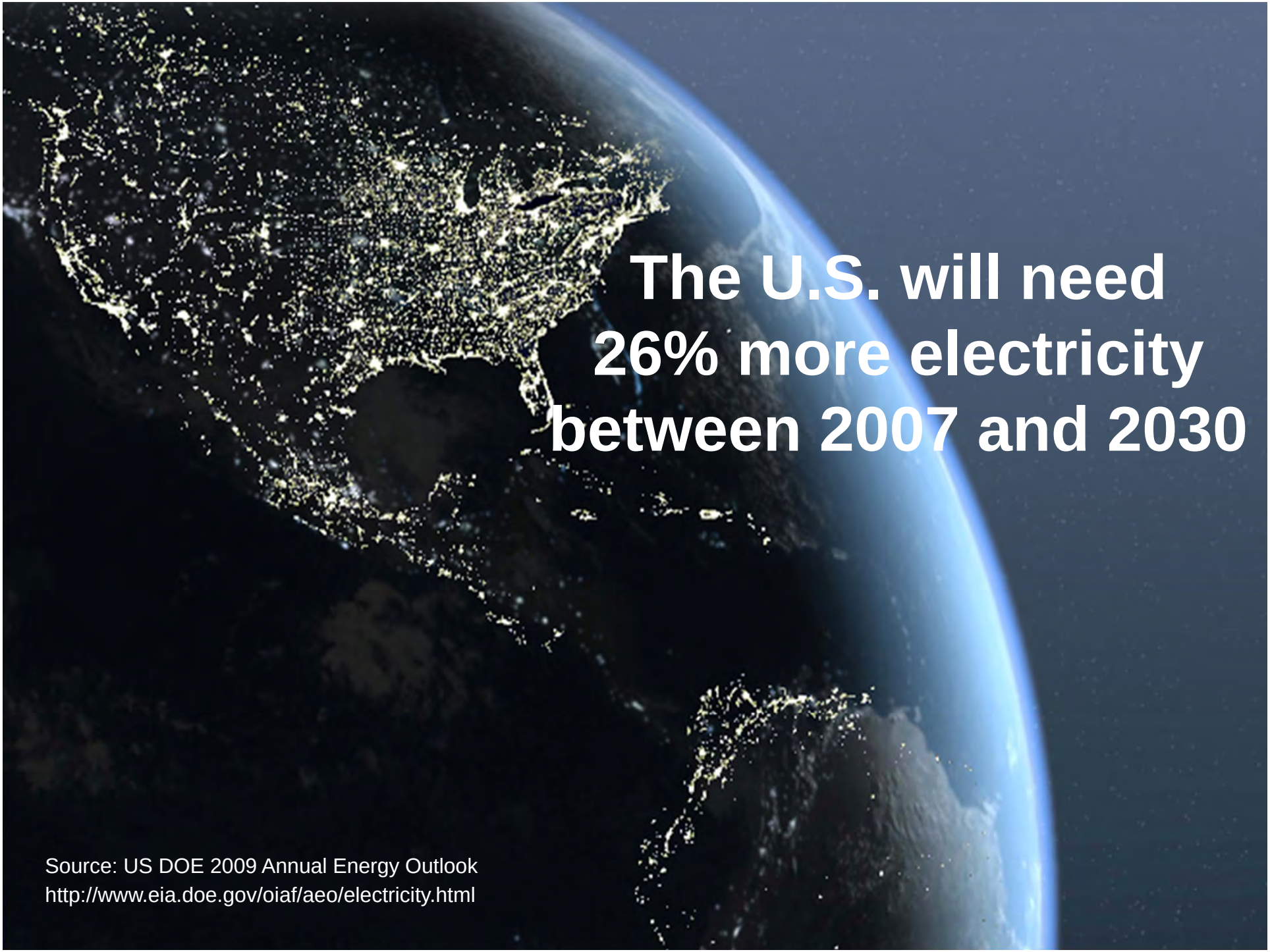
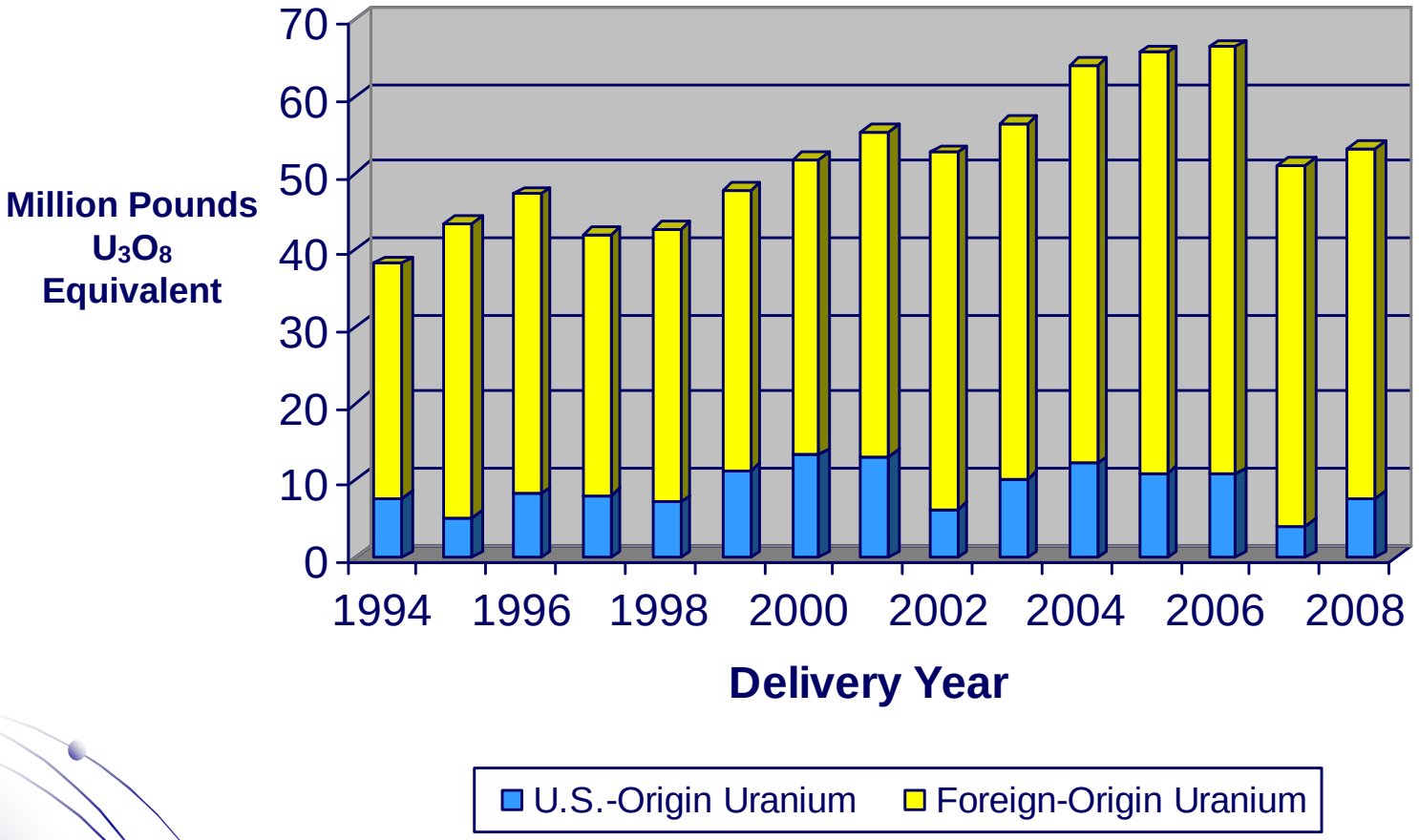

The U.S. will need
26% more electricity
between 2007 and 2030
Source: US DOE 2009 Annual Energy Outlook
http://www.eia.doe.gov/oiaf/aeo/electricity.html

Uranium Purchased

By Owners & Operators of U.S. Civilian Nuclear Power Reactors



Source: U.S. Department of Energy, Energy Information Administration

http://www.eia.doe.gov/cneaf/nuclear/umar/summarytable1.html

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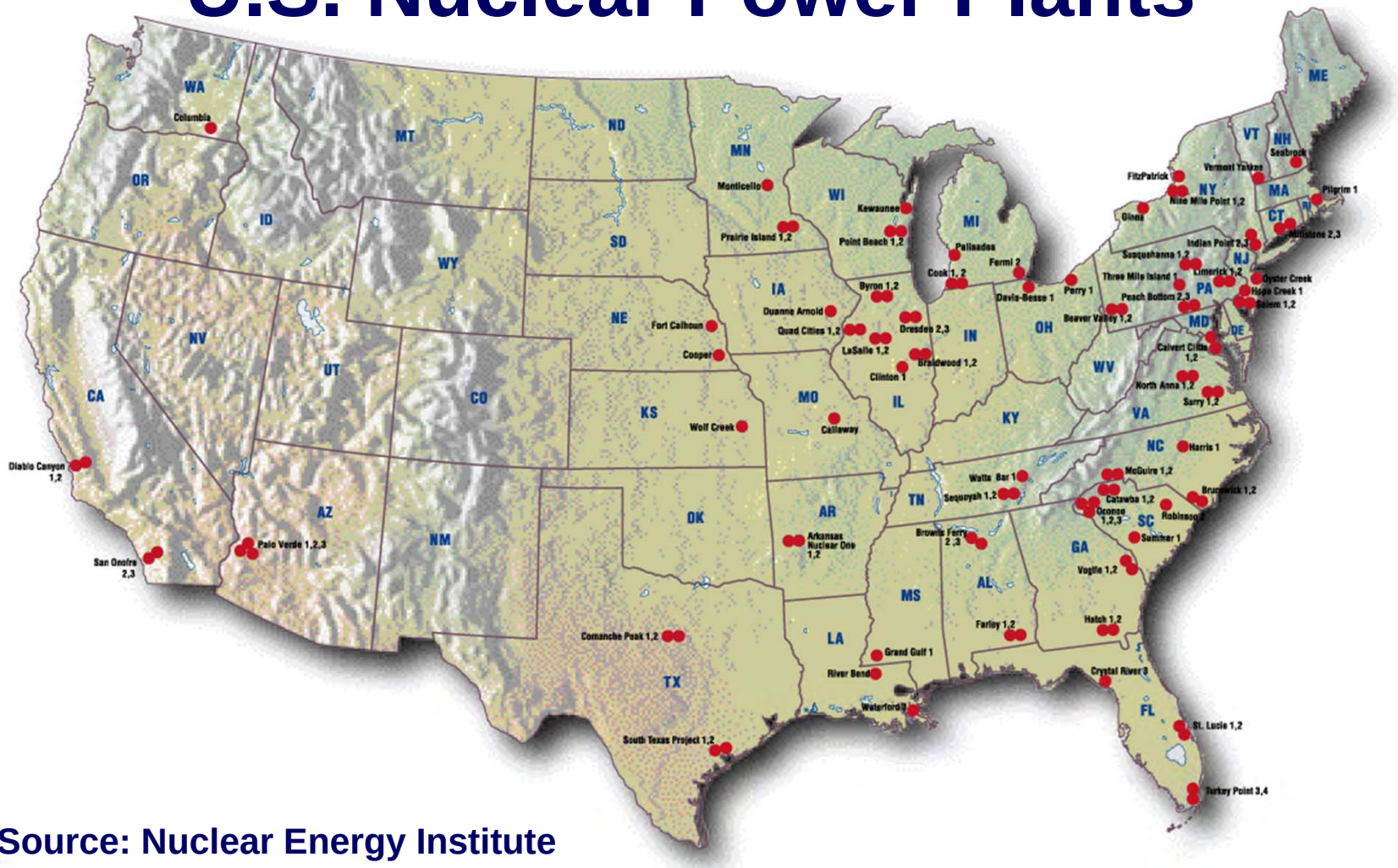
104 Operating U.S. Nuclear Power Plants



Source: Nuclear Energy Institute
http://nei.org/resourcesandstats/nuclear_statistics/usnuclearpowerplants/

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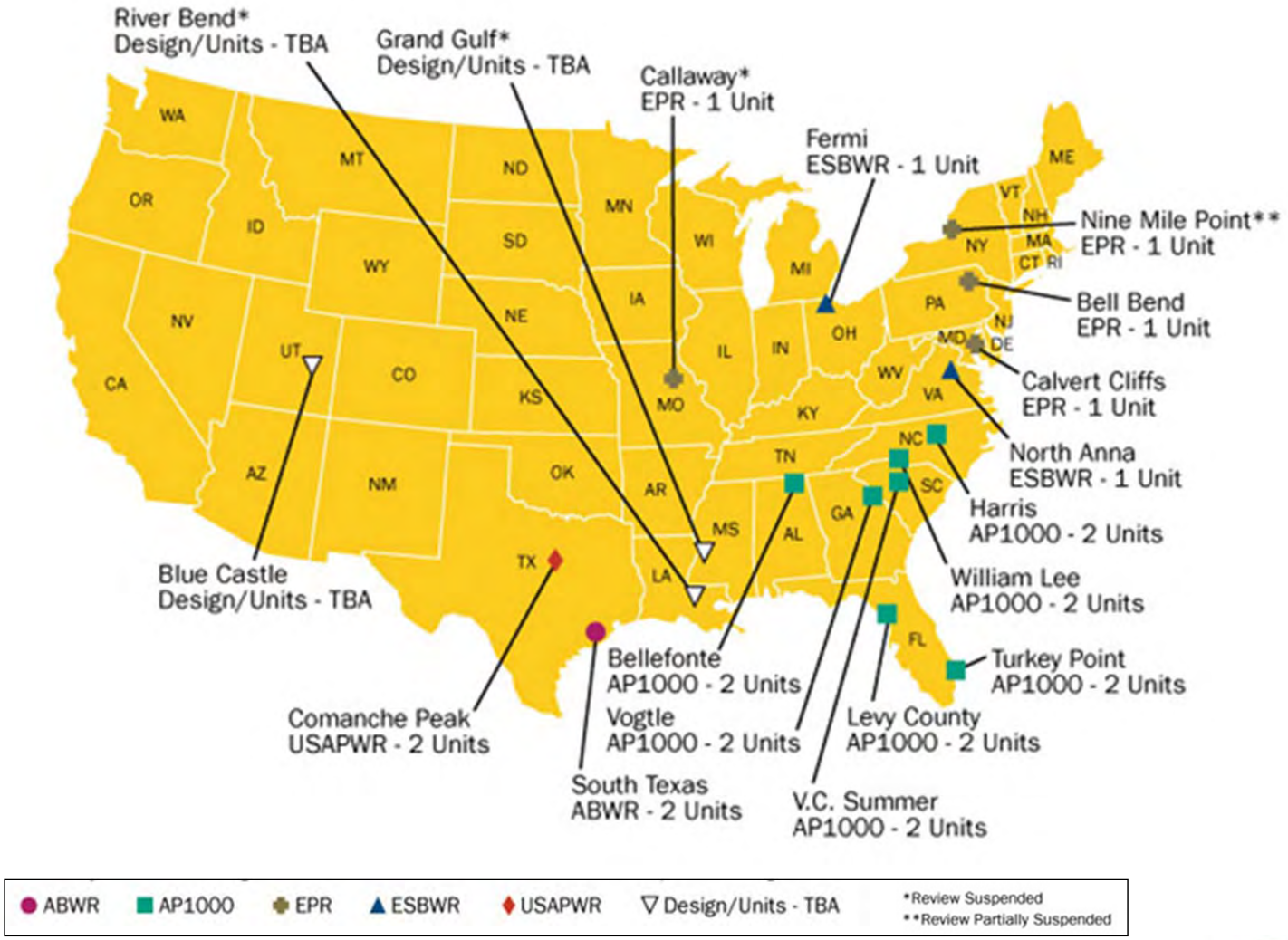
Projected New Nuclear Power Reactors



Source: U.S. Nuclear Regulatory Commission
http://www.nrc.gov/reactors/new-reactors/col/new-reactor-map.html

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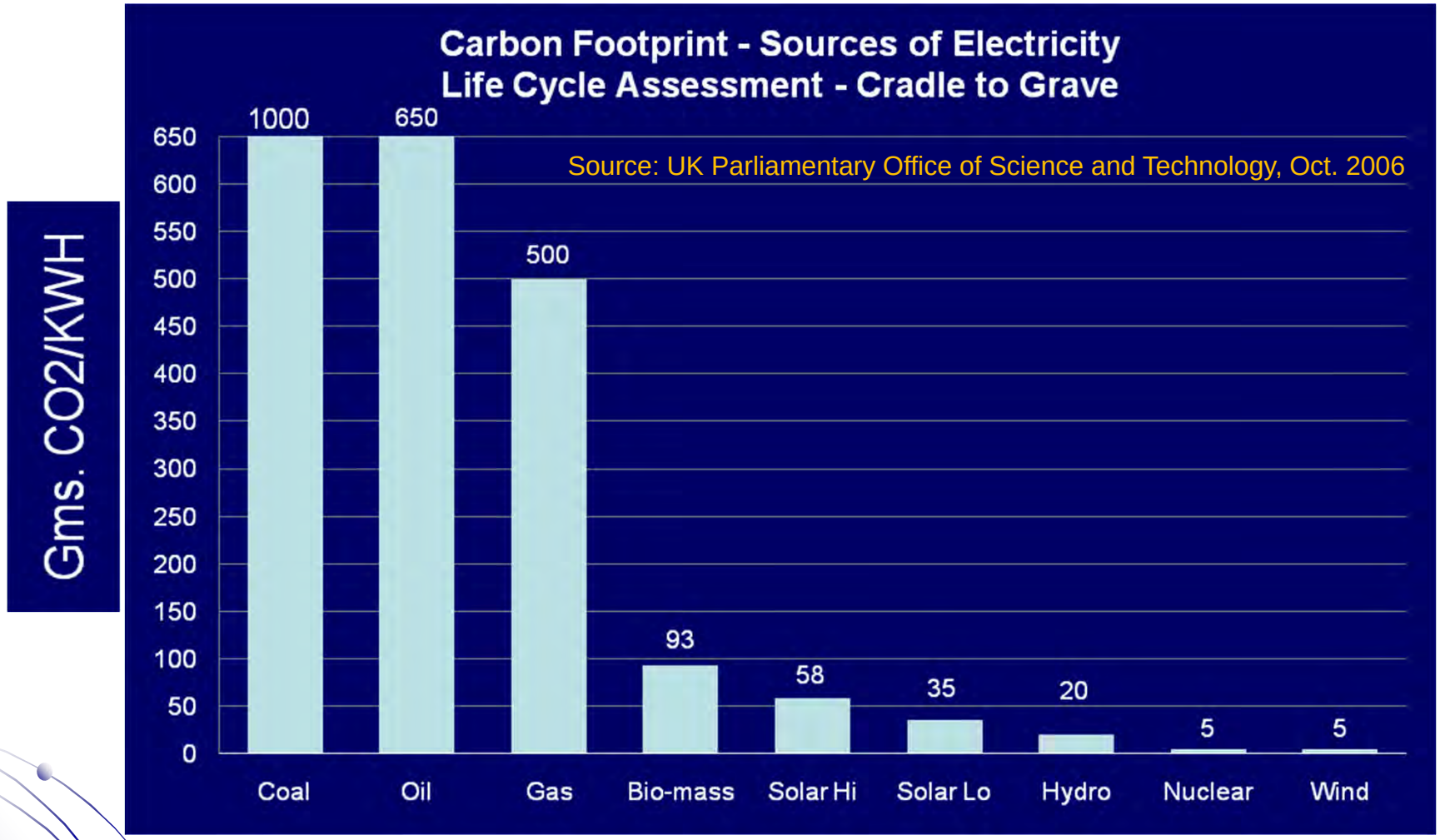
Nuclear Power – the Clean Choice



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Other Benefits of Nuclear Power

- Reliable – 24 / 7
  - Produces at night
  - Produces when cloudy
  - Produces when wind isn't blowing

- Efficient
  - 20% of total electrical output but <10% of capacity
- Safe and Secure
  - Would have to live near a nuclear power plant for more than 2,000 years to get same radiation exposure as an x-ray *(Clean and Safe Energy Coalition)*
  - "Are probably our best defended targets," (*Center for Strategic and International Studies)*

Safe and

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Early Uranium History

- 1789 - Discovered by German chemist Martin Klaproth
  - Used only as coloring agent for glass & ceramic glazes
- 1896 – Becquerel discovers uranium's radioactivity
    - Uranium Discovered in Craven Canyon
- 1898 – Marie & Pierre Curie discover radium
  - Thought to be miracle cure for cancer
  - Rapid expansion in uranium mining until late1930's
- Curies' work led study of uranium around the world
  - 1939 - First proven nuclear fission (Germany)
  - 1942 – First chain reaction by Enrico Fermi (U of Chicago)
  - 1945 – First nuclear weapons used (Hiroshima, Japan)

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Mining in the Edgemont Area

- 1951 – June - Uranium discovered in Craven Canyon – Jerry Brennan
- 1952 – January first shipment of U to Rifle CO – Roy Chord
- 1952 – U.S Atomic Energy Commission built buying station in Edgemont – December
- 1954 – Mill was needed
- 1955 – March contract was issued to build new mill

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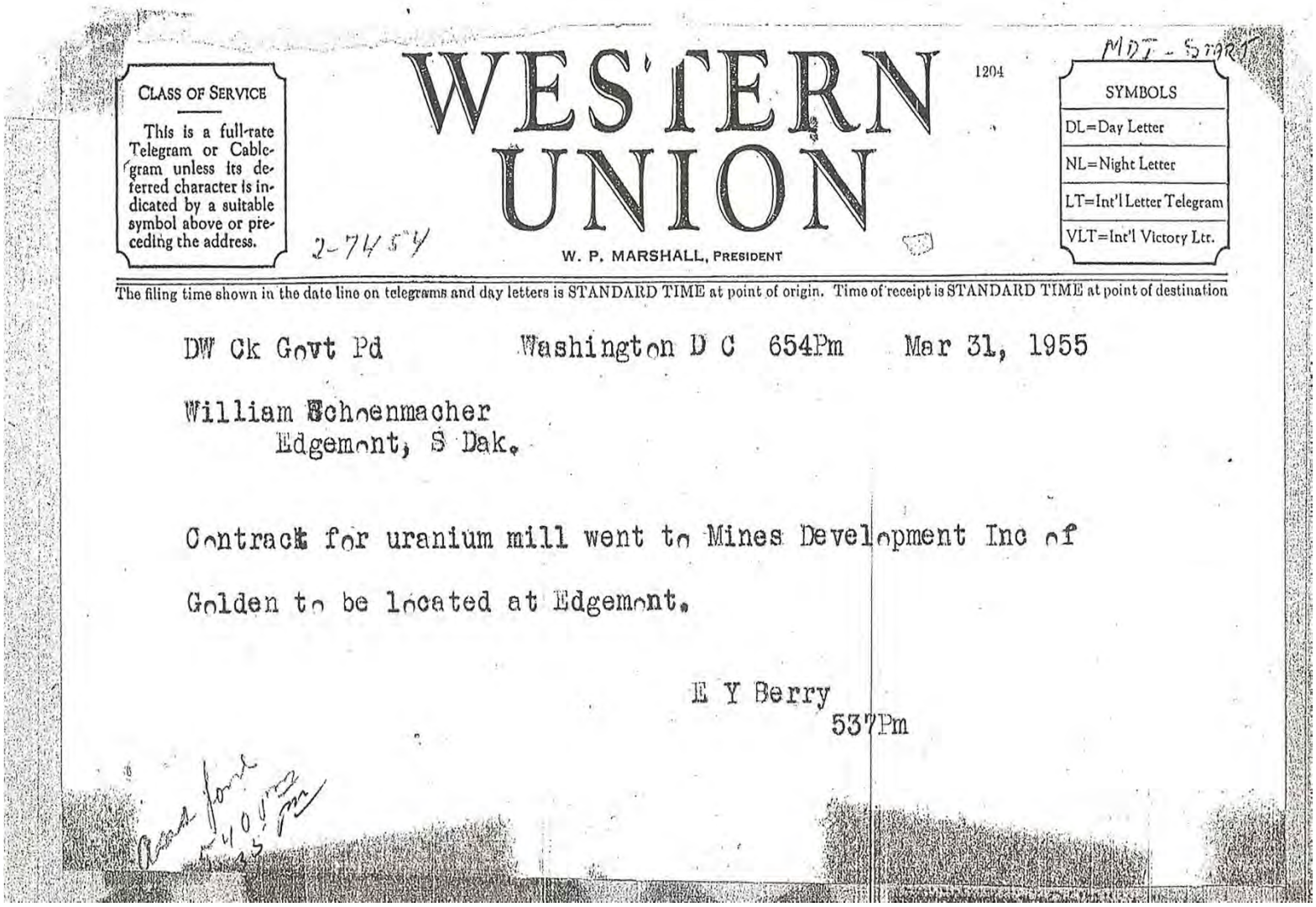

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2-7454

WESTERN UNION

1204

W. P. MARSHALL, PRESIDENT

MDT - Smart

SYMBOLS
DL=Day Letter
NL=Night Letter
LT=Int'l Letter Telegram
VLT=Int'l Victory Ltr.

The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination

DW Ck Govt Pd Washington D C 654Pm Mar 31, 1955

William Schoenmacher
Edgemont, S Dak.

Contract for uranium mill went to Mines Development Inc of Golden to be located at Edgemont.

E Y Berry
537Pm

Read form 4-0 [illegible] Pm

Above is pictured Governor Joe Foss, Miss Donna Rea Seppala, as "Miss Uranium", and Allen Gray, Vice President and General Manager of the Mines Development Corp., as they are escorted through the main street of Edgemont in the convertible Eldorado Cadillac, owned and driven by Roy who is pictured with Mrs. Chord, as they are taken to the site of the uranium mill, preceding the ceremonies.

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Edgemont Uranium Mill

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Firm to Get Uranium From Dakota Lignite

DENVER — (AP) — Susquehanna-Western, Inc., announced Monday it is ready to buy and process uranium-bearing lignite ores in North and South Dakota.

The firm is a division of the Susquehanna Corp. of Chicago.

An official said in a statement that plant operations have solved metallurgical problems of extracting uranium concentrate from lignite in the production of uranium from this source.

The statement said Mines Development, Inc., a Susquehanna subsidiary, will buy all uranium-bearing materials from the Dakota plains mining district and guarantee a market through 1966.

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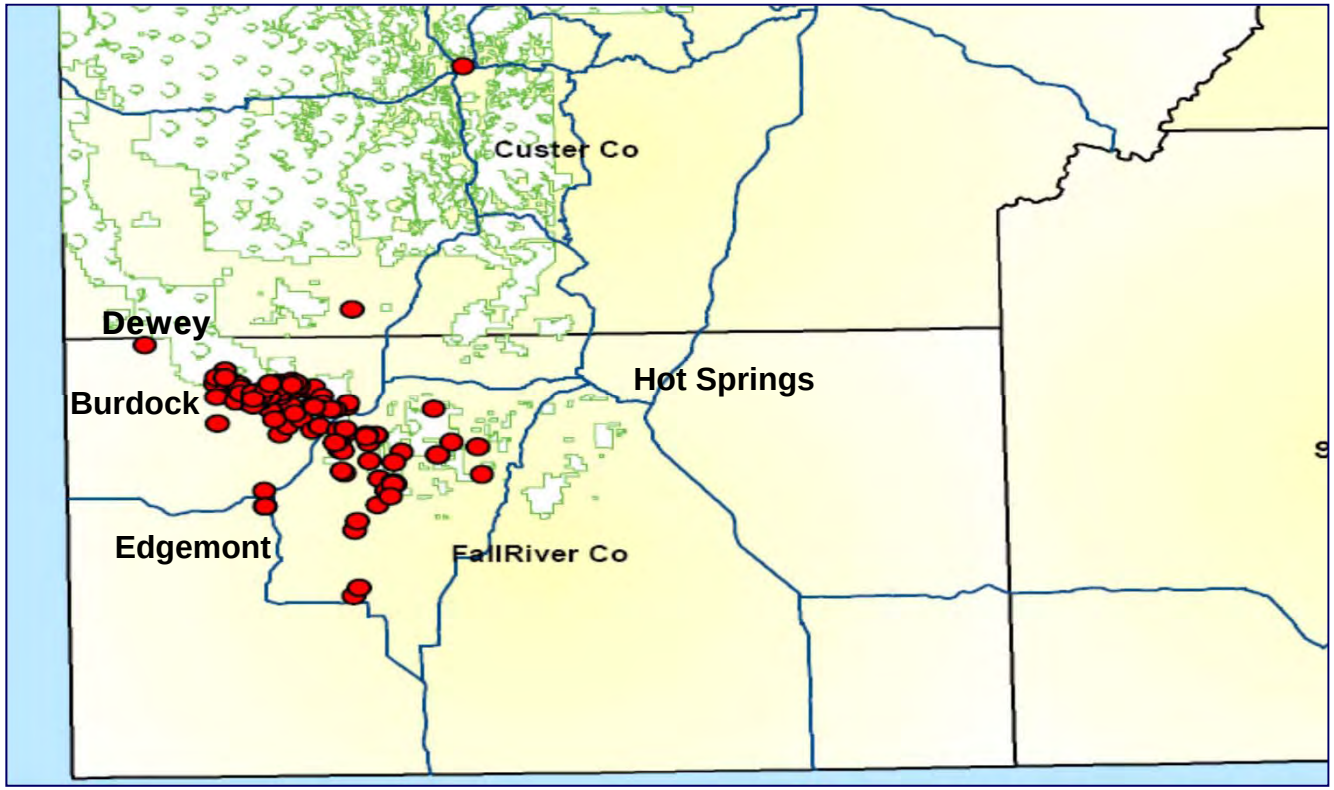
Uranium Mines & Sites - Fall River County



128 Fall River County mines listed:

www.mindat.org/loc-44863.html

With names like Trail Wind, Apple Pie,
Get Me Rich, Yellowcat, Green Slipper,
PeeWee & Rip Snorter

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Darrow Mine

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ISR Well Field
Recovering Uranium

Cameco's Crow Butte ISR, Crawford, NE

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Spencer Richardson
New mining standards in place

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In Situ Recovery History

- 1974 – First *in situ* uranium recovery permit issued (Texas)
- 1980's
  - U.S. producers turned to in-situ recovery operations to extract uranium from ore
  - Oxygen technology for ISR perfected
- 2004 - 6 uranium extraction operations in U.S.
  - 3 conventional
  - 3 *in situ*

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In Situ Treatment
In Environmental Remediation

EPA

www.epa.gov

science in ACTION

BUILDING A SCIENTIFIC FOUNDATION FOR SOUND ENVIRONMENTAL DECISIONS

LAND RESEARCH PROGRAM

IN SITU TREATMENT TECHNOLOGIES REDUCE SITE CLEANUP COSTS

Issue:

Groundwater treatment employs many different technologies. Conventional *ex situ* (removed from source) treatment methods, such as pump and treat, can have substantial operation and maintenance costs and may not achieve cleanup objectives within reasonable time frames, if at all. As an alternative, *in situ* (at source) processes treat soils and groundwater in place (without removal) with physical/chemical or biological treatment technologies. This approach may be advantageous since the costs of materials handling and some environmental impacts, such as energy use and disruption of the surrounding area, may be reduced.

Scientific Objective:

The U.S. Environmental Protection Agency's (EPA) Land Research Program in the Office of Research and Development (ORD) has made significant contributions to exploring innovative solutions to groundwater pollution problems and translating research results into practical applications. Scientists are evaluating the use of *in situ* treatment at hazardous waste sites and verifying innovative technologies. Research currently focuses on air sparging, thermal treatment, permeable reactive barriers, chemical treatment, bioremediation, phytoremediation, and monitored natural remediation. More information can be found at: www.frtr.gov/optimization/treatment/insitu.htm or http://clu-in.org. Technologies are tested by scientists in laboratories and with pilot-scale demonstration projects.

In situ processes can be used in combination with each other and with more conventional *ex situ* treatments to enhance their effectiveness. Removal rates and extent vary on the basis of contaminants and site-specific characteristics; contaminant distribution and concentration; co-contaminant concentrations; indigenous microbial populations and reaction kinetics; and soil parameters. Many of these factors are site dependent and can be difficult to manipulate. As a result, *in situ* treatment may not be uniform throughout the treatment area.

Application and Impact:

ORD's evaluation of new technologies and collaboration with EPA's regional offices has reduced remedial costs and improved effectiveness. Research contributions include:

- ORD scientists are continuing to investigate the fundamental and applied aspects of In Situ Chemical Oxidation (ISCO). ISCO introduces a chemical oxidant into the subsurface to transform groundwater or soil

continued on back

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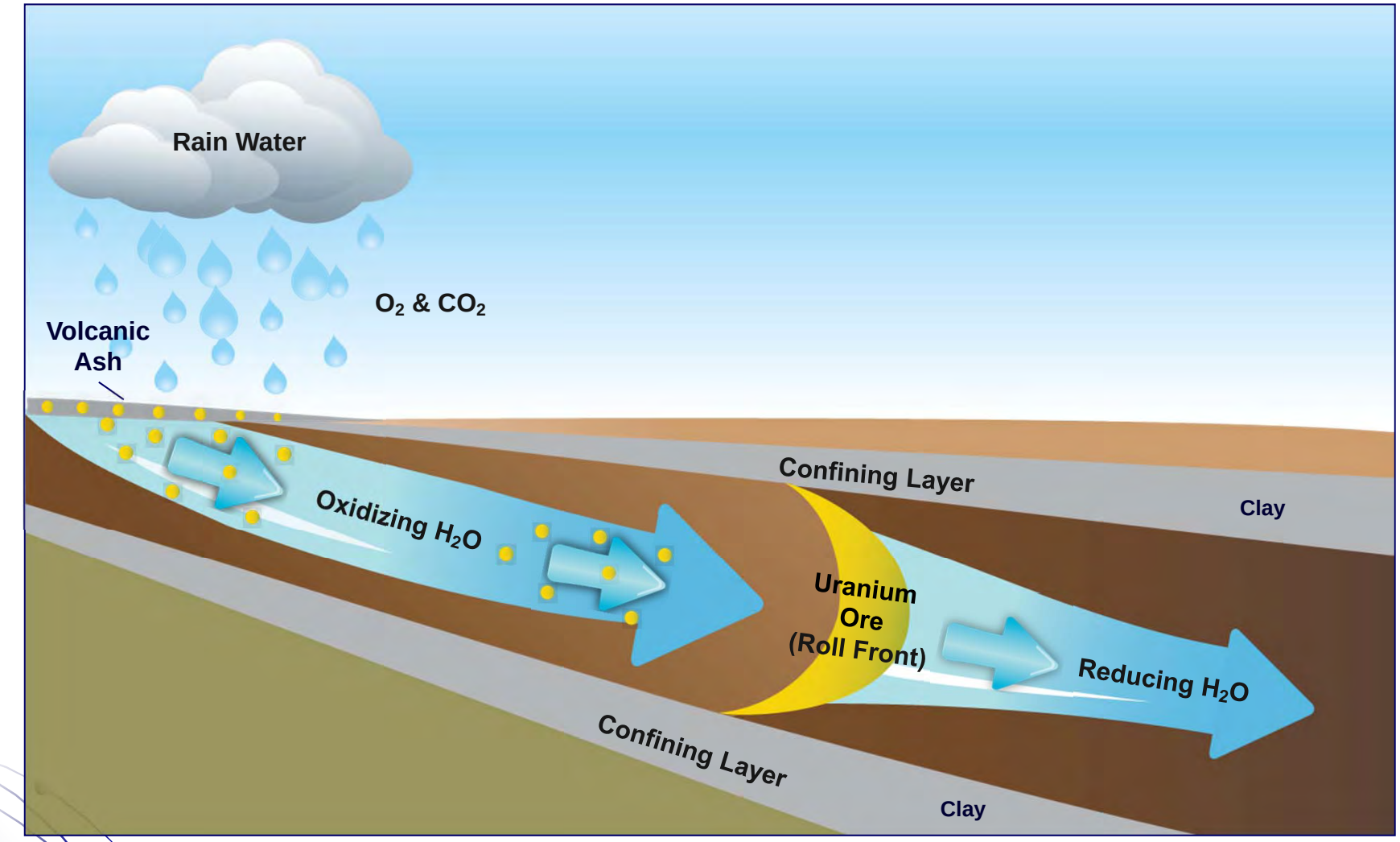
Origin of Uranium Roll Front Deposits



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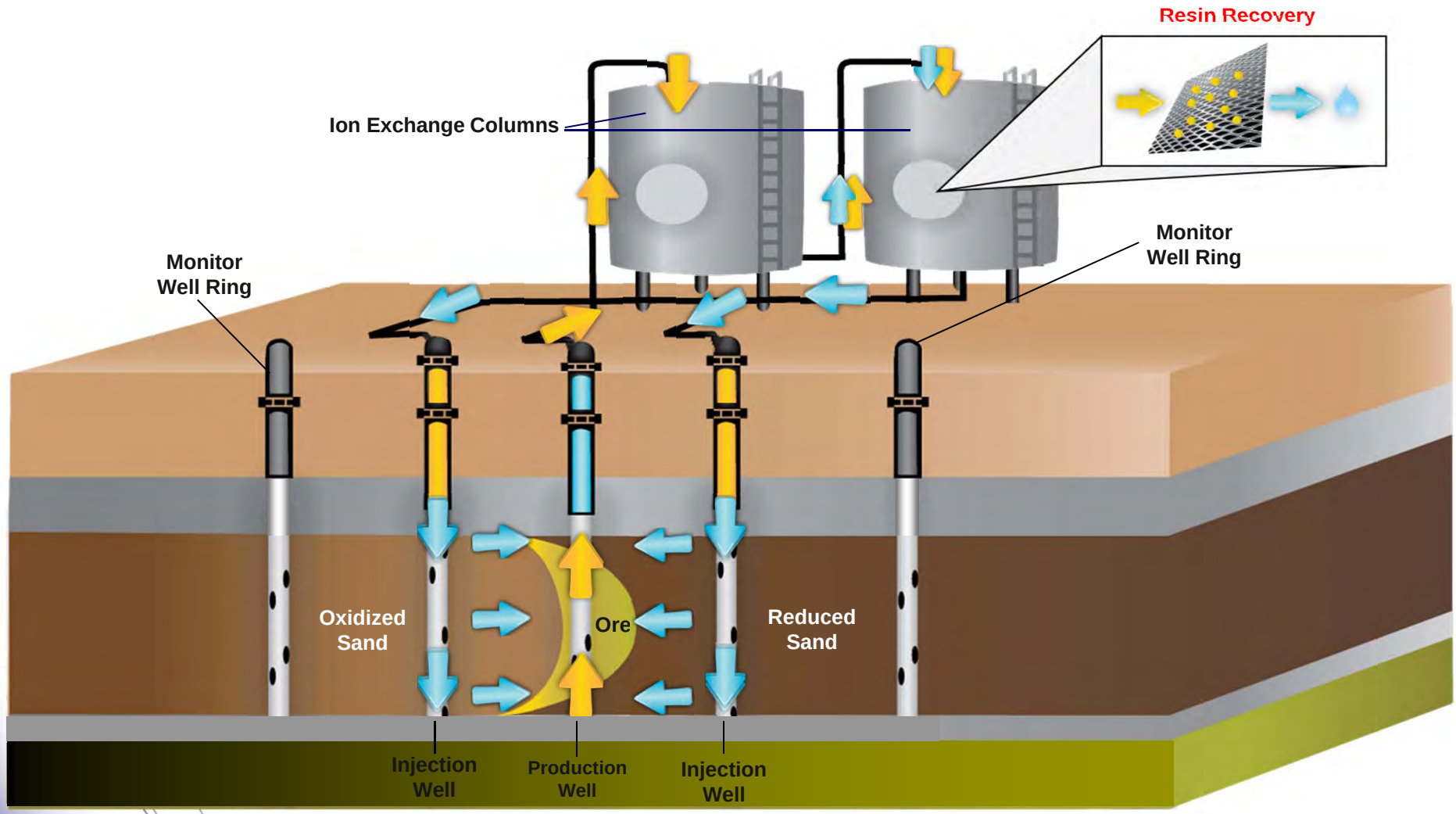
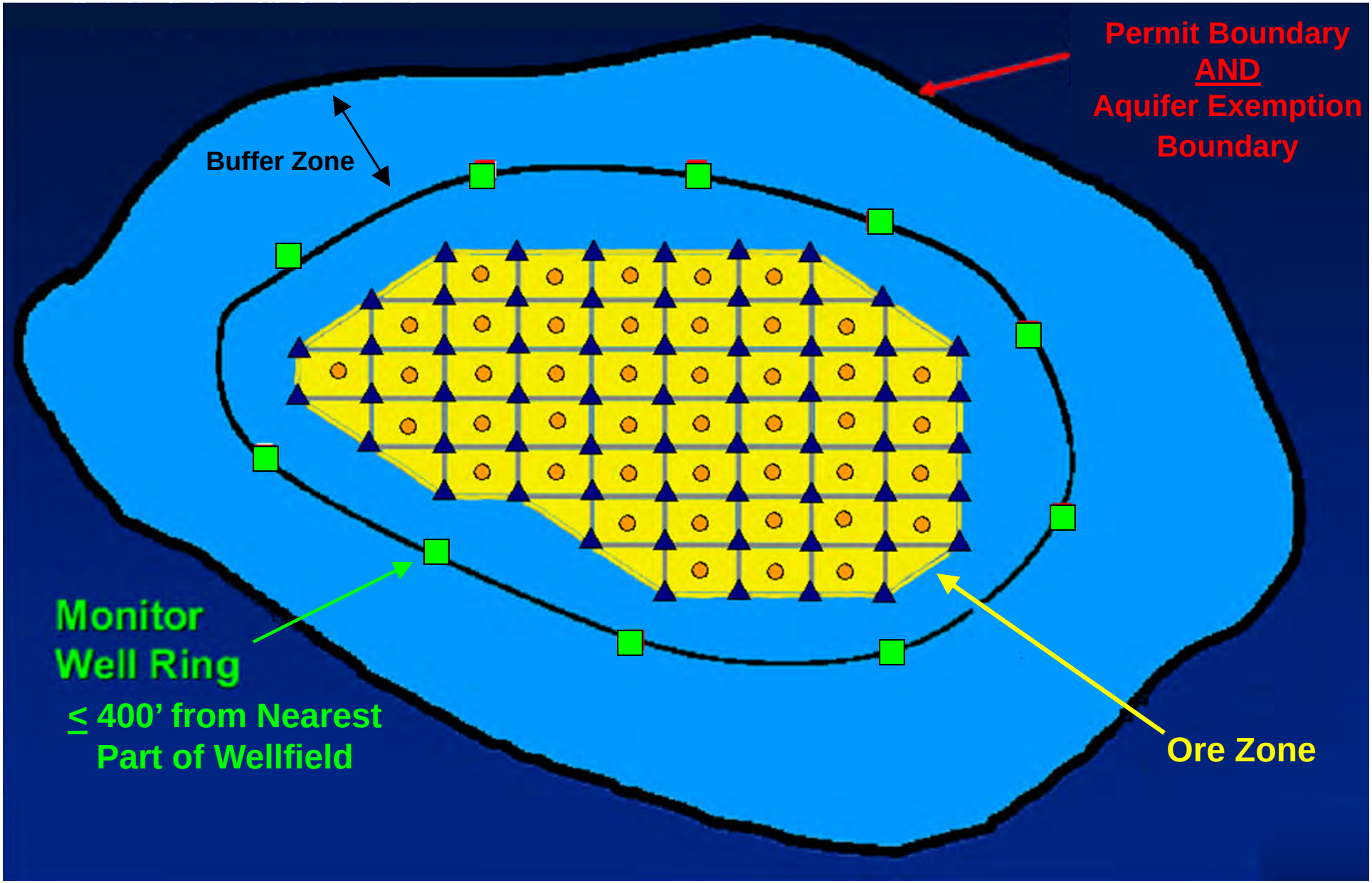
In-Situ Recovery

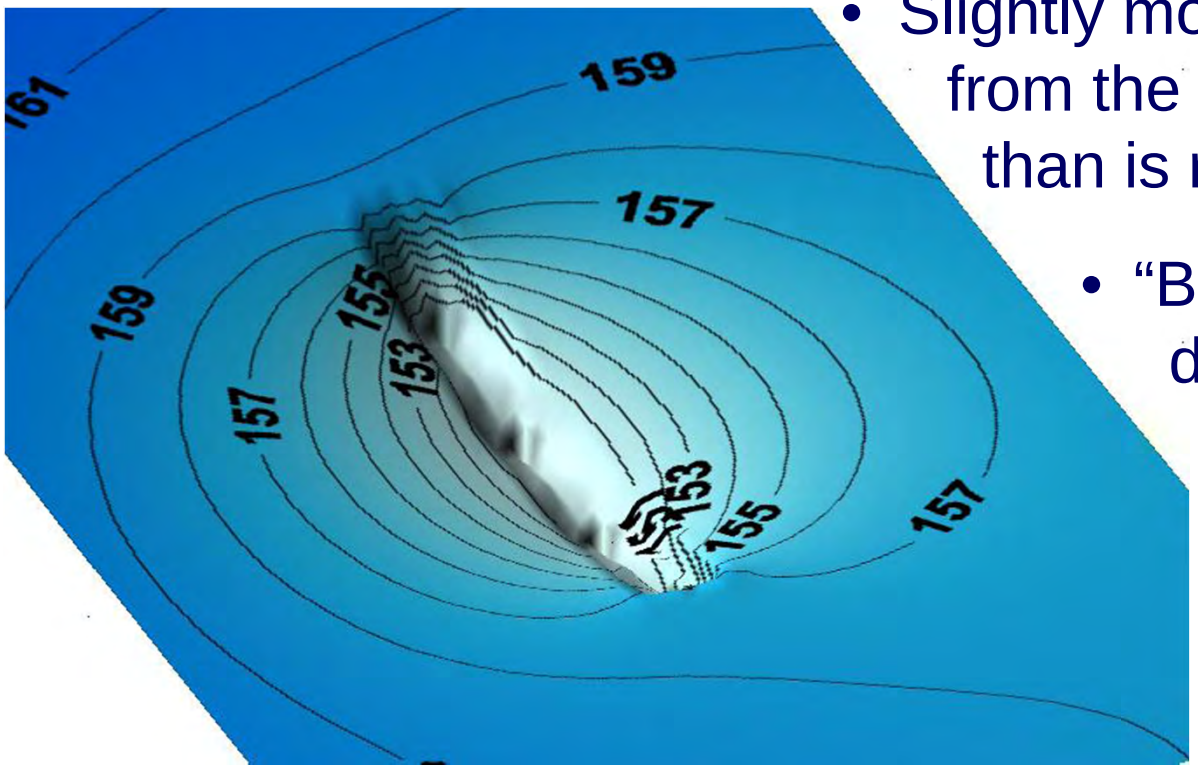
Temporarily Reverses the Natural Deposit Process



Typical ISR Wellfield Layout



Cone of Depression Created



- Slightly more water is extracted from the ore-bearing formation than is re-injected
  - "Bleed" produces cone of depression in mining area
  - Cone of depression controls fluid flow – confining it to the mining zone

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Groundwater Usage in ISR

- Native to ore formation
- Contains uranium and other radionuclides
- Not suitable for drinking water, livestock or agriculture
- Augmented with O_2 , CO_2
- Recirculated
- Bleed stream is typically .5 - 3%
- Agreement with County on wells

Photo courtesy of Crow Butte Resources

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End of Production

- Groundwater quality restored to prior use
- Wells plugged
- Pipelines removed
- Surface re-vegetated
- Leased land returned to landowner

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Dewey-Burdock Reserves

(Nearly 11 Million Pounds of Uranium Oxide)

Enough Energy to Power South Dakota for over 15 years

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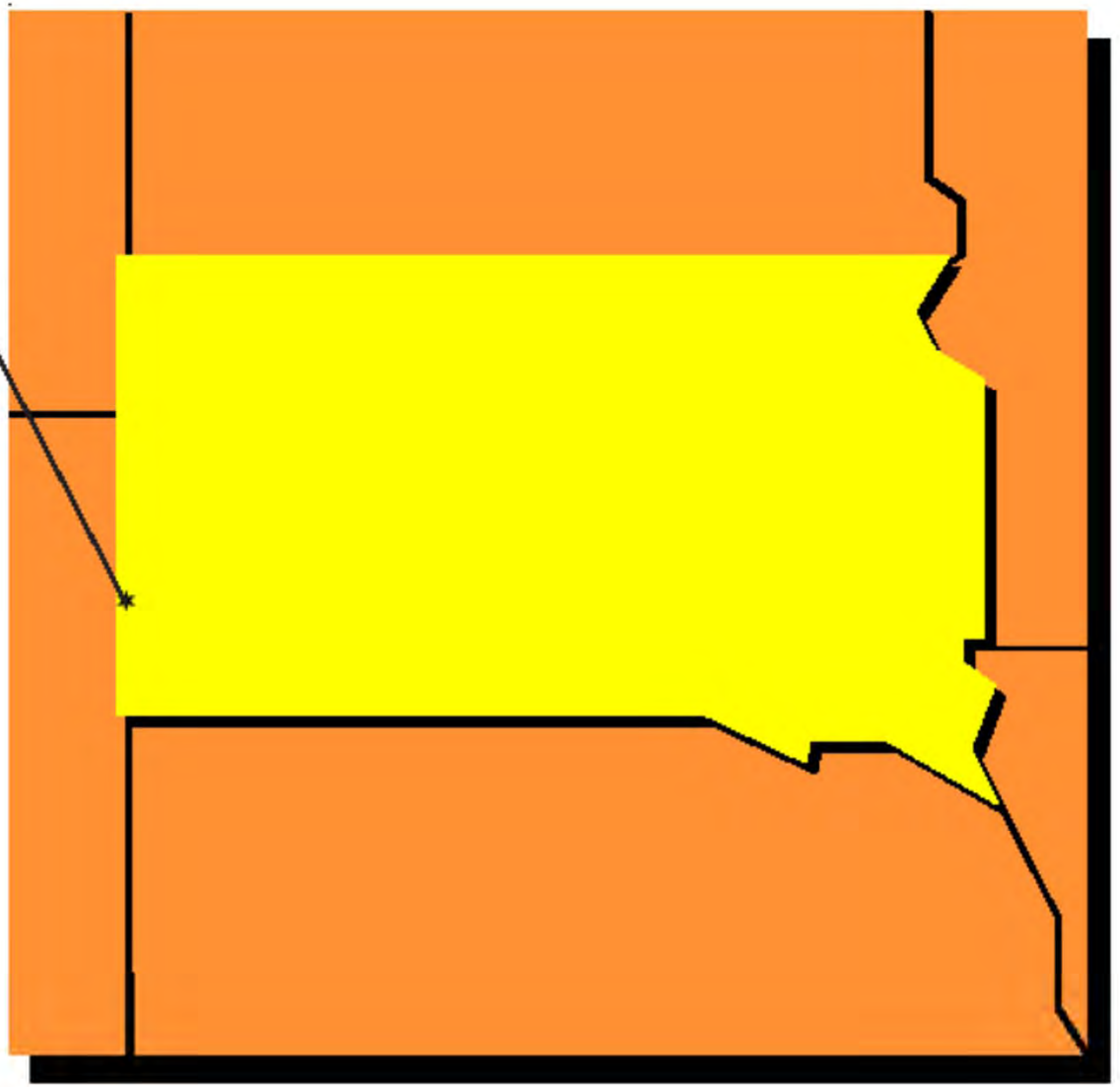
Located about 12 miles northwest of Edgemont, South Dakota



POWERTECH (USA) INC.

- A South Dakota corporation
- Project office Edgemont
- Corporate office Greenwood Village, CO
- Almost all employees work and live in U.S.
- Subsidiary of Powertech Uranium Corp.

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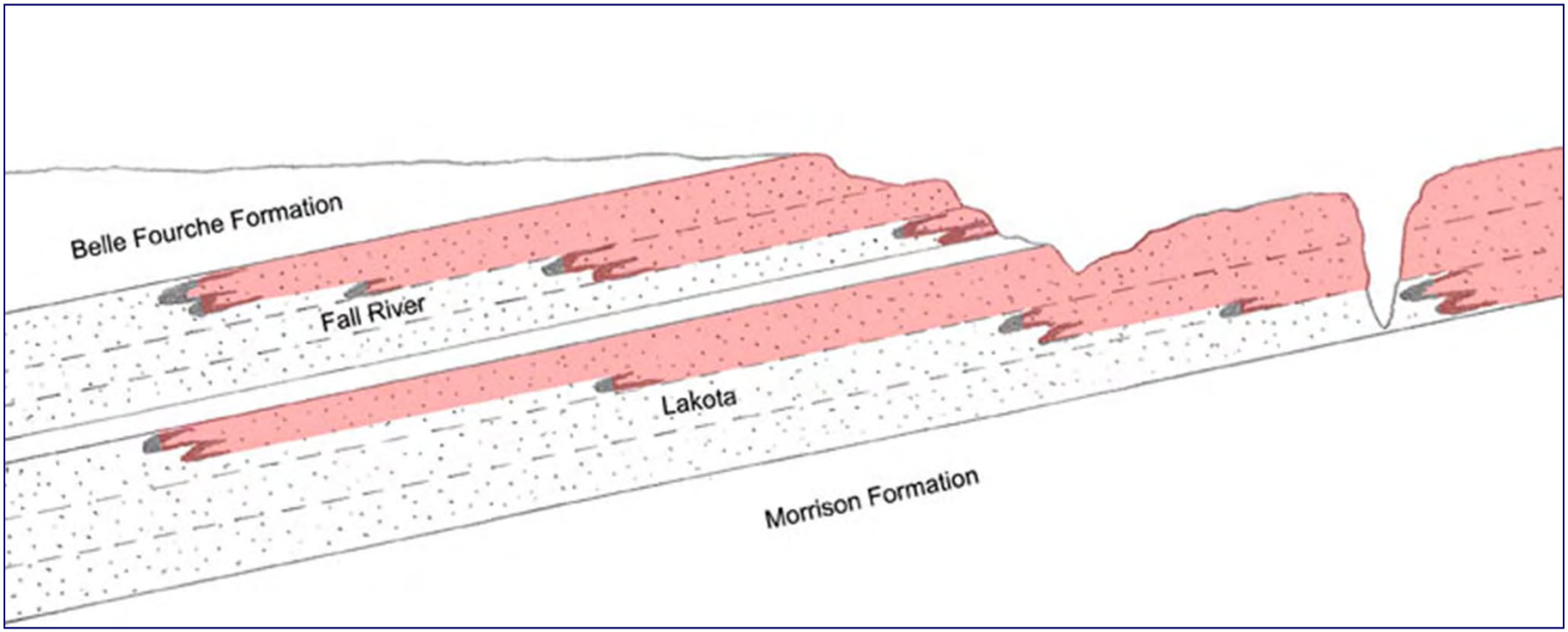
Cross-Section of Uranium Occurrences Black Hills Uranium District



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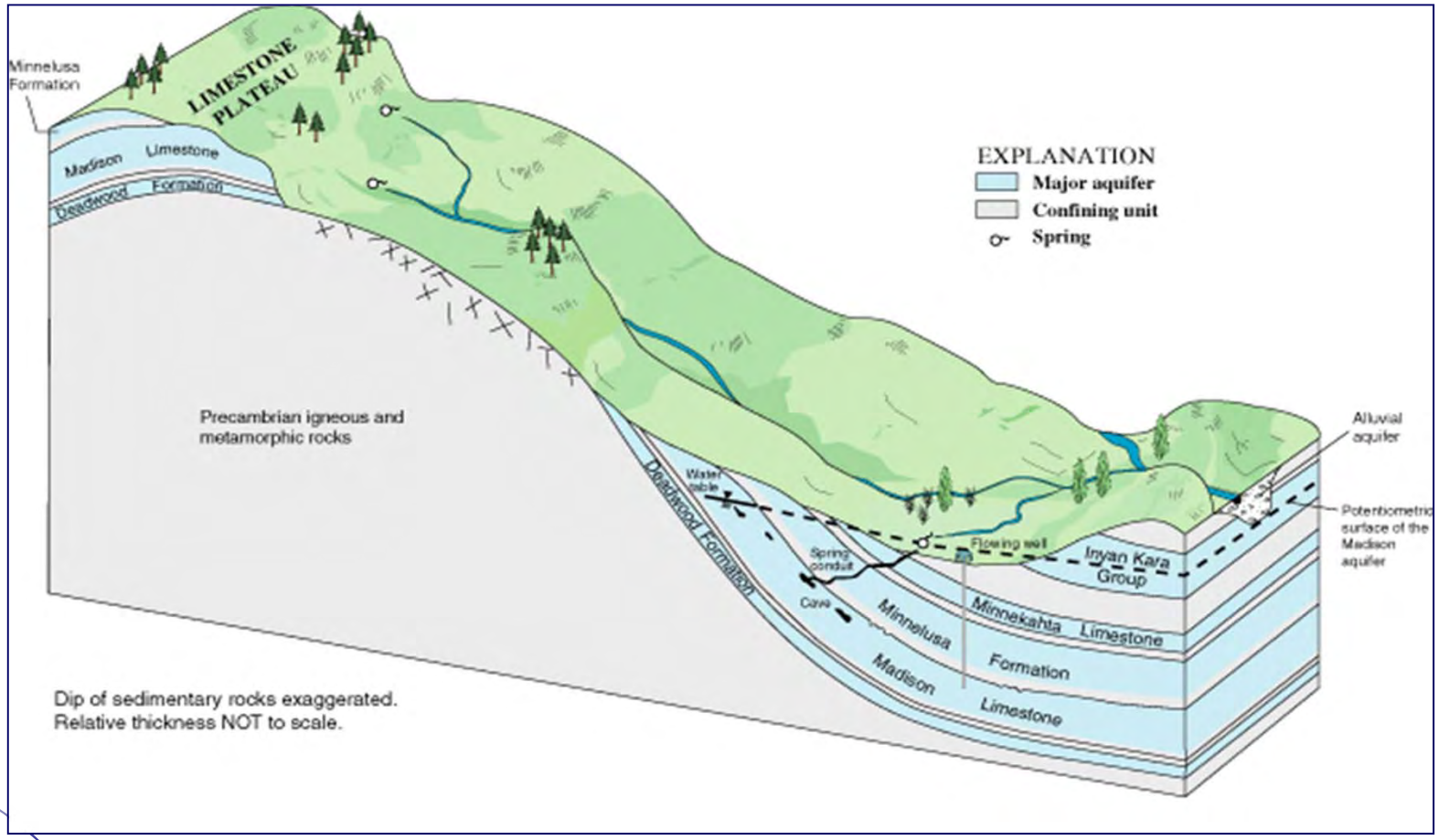
Simplified Hydrologic Setting of the Black Hills Area



Source: *Atlas of Water Resources in the Black Hills Area, South Dakota*; U.S. Geological Survey

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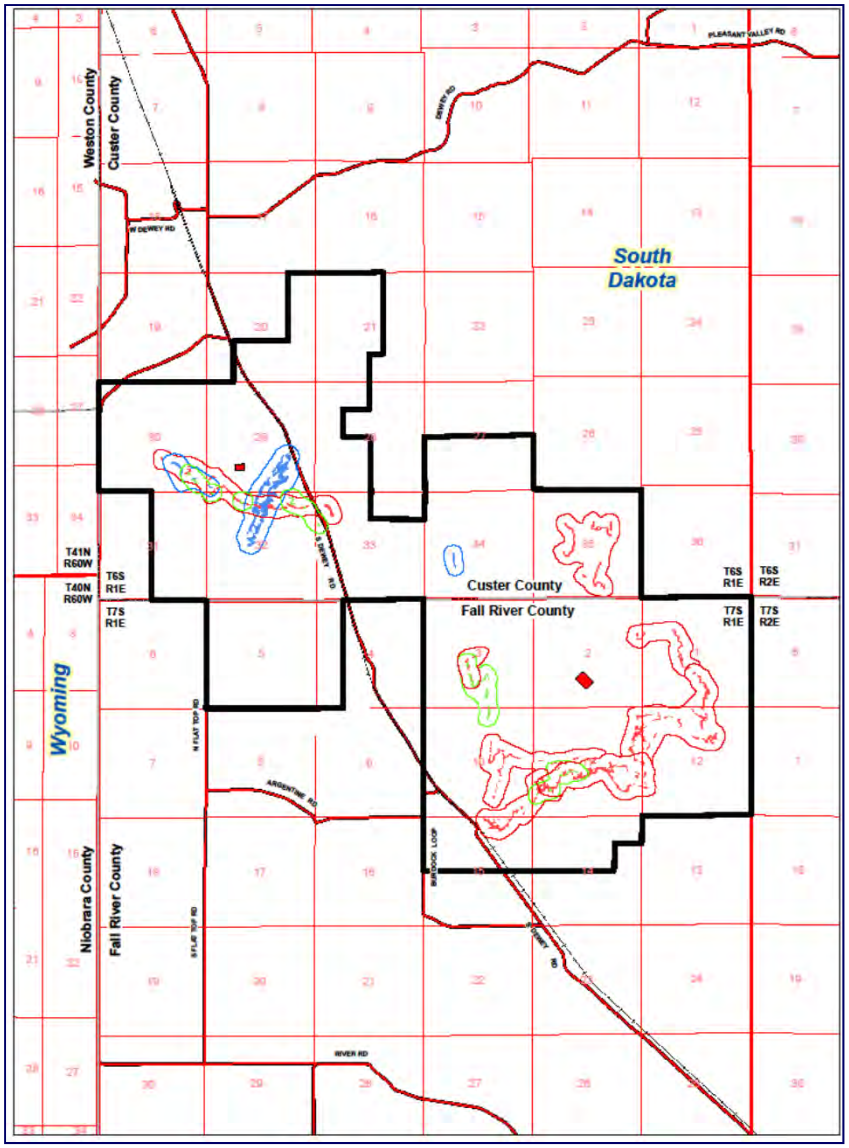
Potential Well Field Areas



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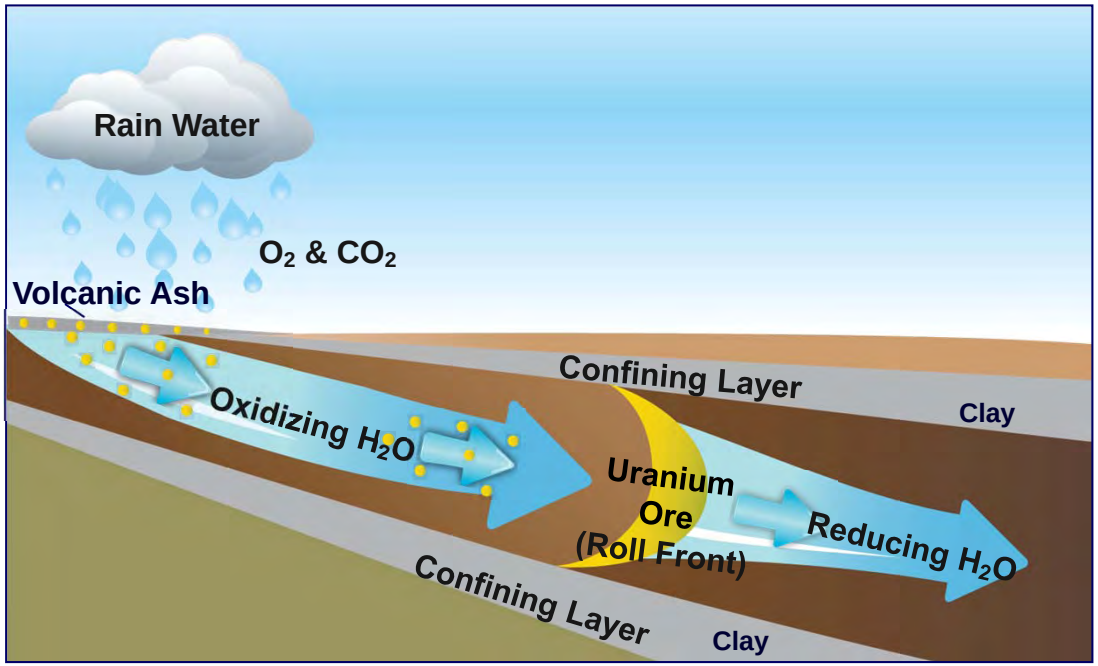
Natural Features

(Concern #1)

- Geological confinement of ore zone
- Natural precipitation of uranium out of groundwater in oxygen deficient environments



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Operational Features

(Concern #1)

- **Wellfield Design:** Injection and extraction pressures keep the solution moving through the ore
- **Bleed Pressure:** Slightly more water withdrawn than re-injected. Gradient results in a flow toward production wells, not away from them.
- **Monitor Wells:** Measure groundwater levels and chemistry, allowing adjustments of injection, extraction and bleed rates to balance wellfield.

Wellfield Control

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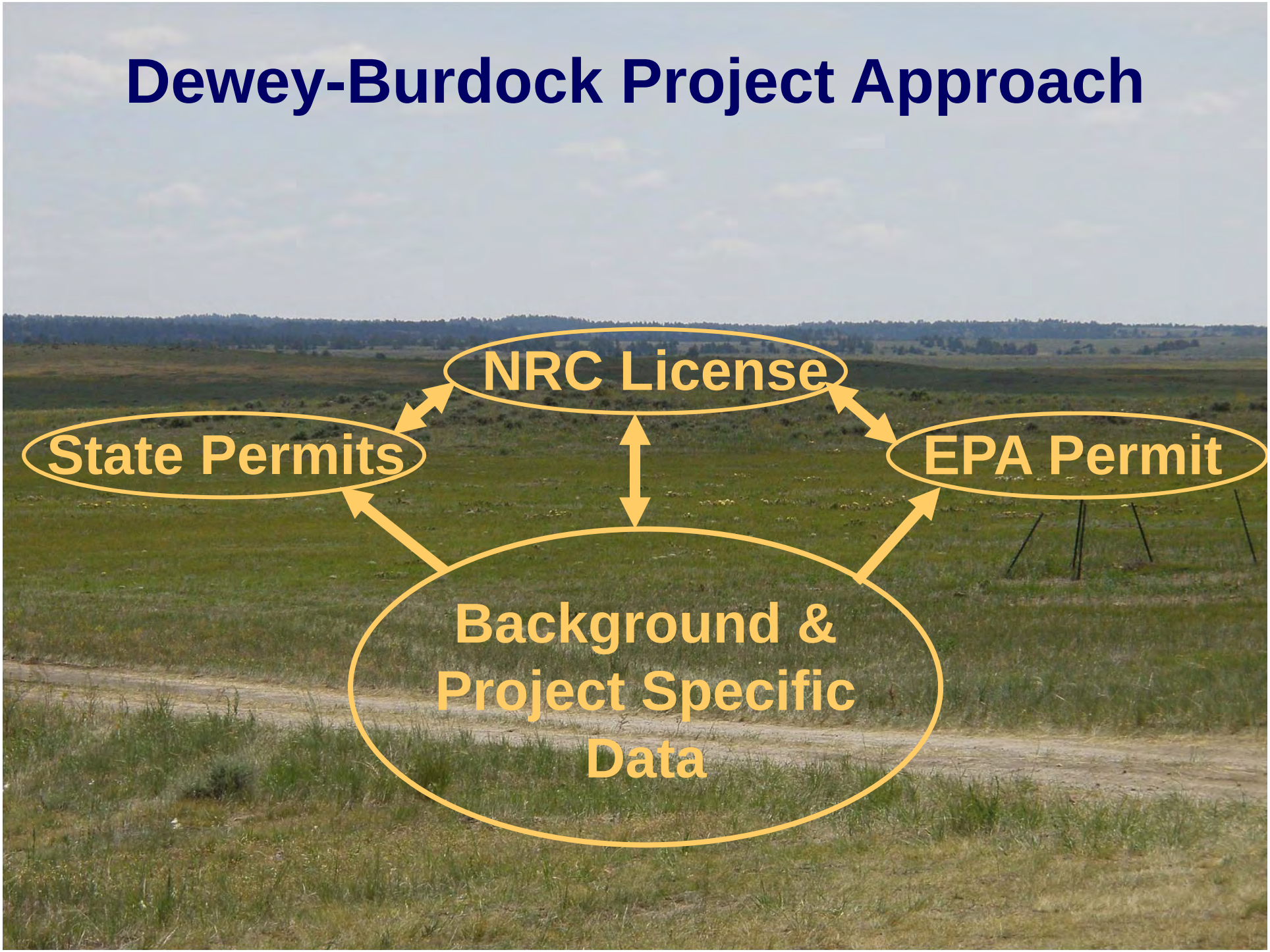
Dewey-Burdock Project Approach



Baseline Studies & Project Specific Data Collection Completed - Fall 2008

Groundwater Sampling Results

Location	Gross Alpha-Dissolved (pCi/L)	Radium 226-Total (pCi/L)	Radon 222-Total (pCi/L)	Solids-Total Dissolved TDS @ 180 C (mg/L)	Uranium-Dissolved (mg/L)
Ranch A	37.45	17.4	1090	785	0.0014
Ranch B	5.05	2.2	674	1100	ND
Ranch C	373	79.7	132000	950	0.0237
Ranch D	8.2	1.1	305	890	ND
Burdock PT	4090	1192.7	143000	2400	0.172
Dewey PT	656	430.9	462000	930	0.0117
EPA MCL	15	5 [1]	300 [2]	500 [3]	0.03

[1] Radium 226 and 228 (combined)

[2] Proposed MCL

[3] “Secondary” guideline value above which use of water may give rise to complaints

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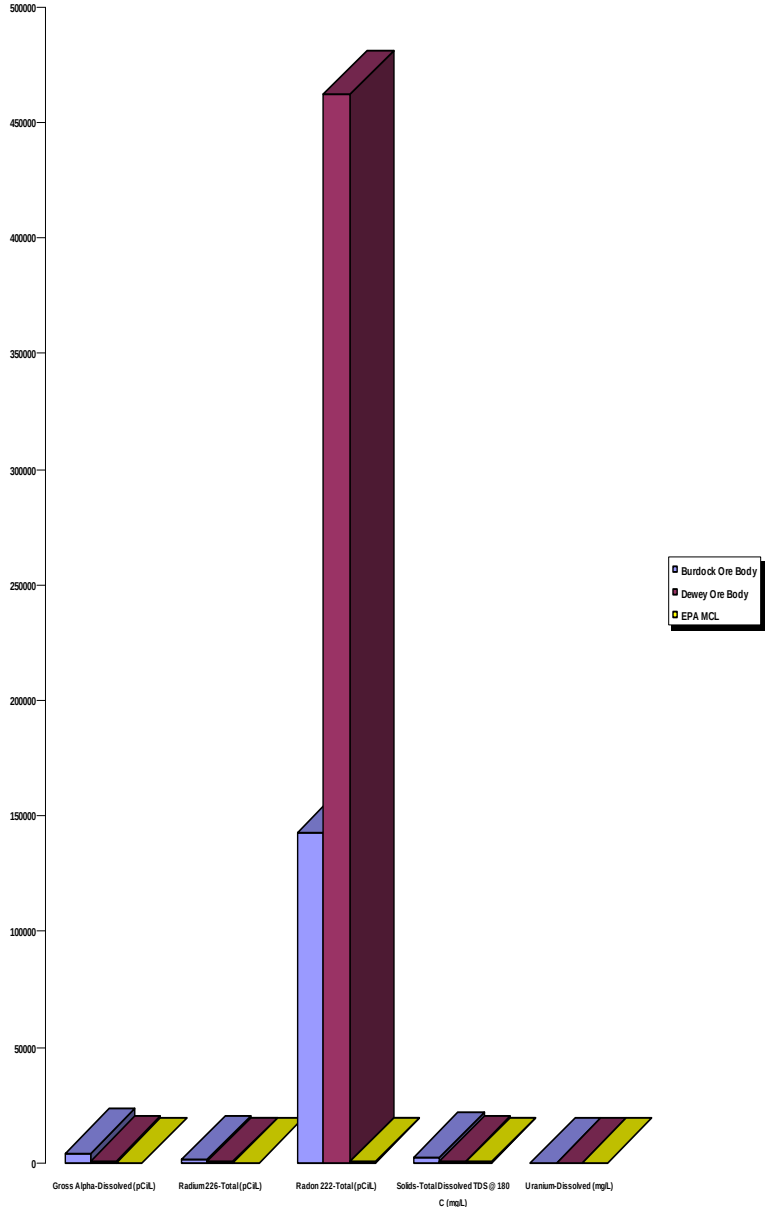
Groundwater Sampling Results



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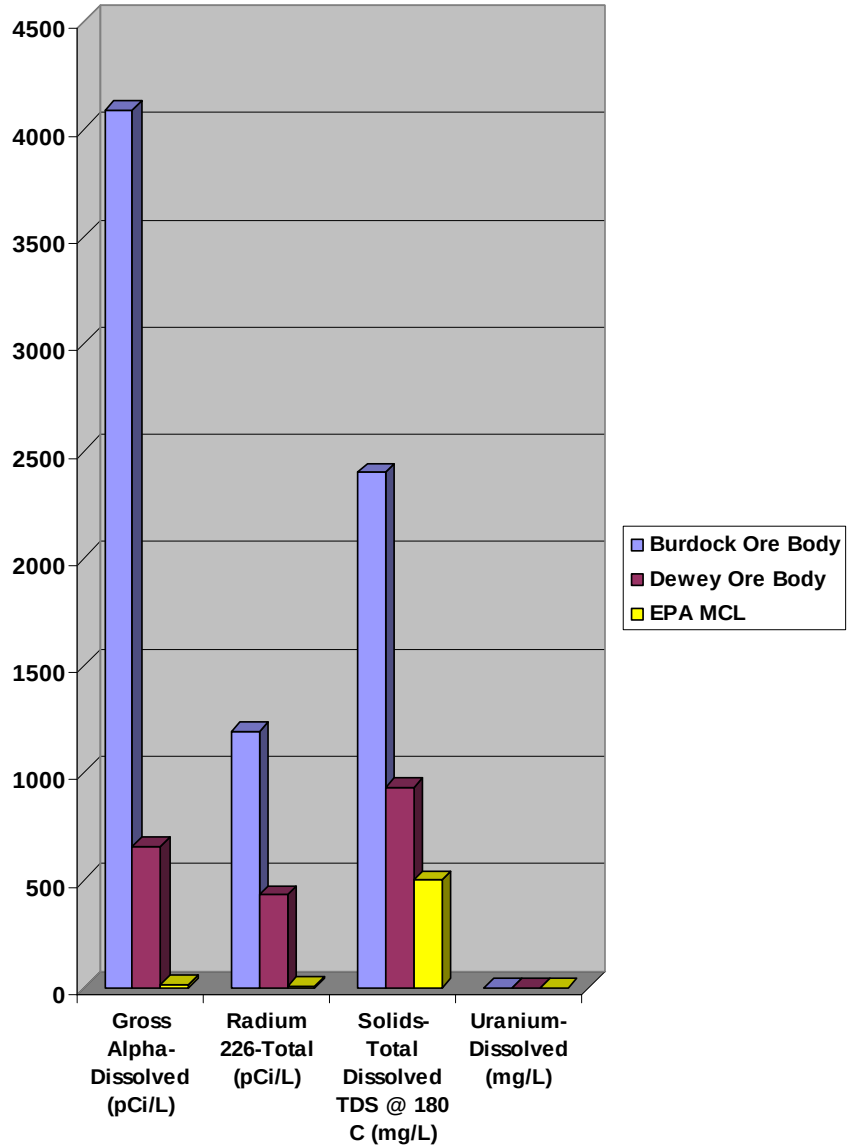
Groundwater Sampling Results w/o Radon



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Inyan Kara Water Use

170 gpm Maximum Consumption
8,500 gpm Recycled

Drawdown at Boundary (Powertech Engineers)

- 10’ Lakota (approximately 450’ available)
- 12’ Fall River (approximately 300’ available)
- Recover to 1’ - 2’ after one year post mining

DENR

- 1,400 acre feet of recharge in the area
- Other users using 327 acre feet
- Dewey-Burdock to use 274.2 max acre feet

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Madison Water Use

551 gpm Maximum Consumption

Drawdown 5 miles from Boundary (Powertech Engineers)

- 8.5’
- Edgemont has 200’ above ground at 16 miles

DENR

- At 1,000 feet - 35’ of head reduction
- Approximately 2800’ of head available

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South Dakota Water Law

Printer Friendly

46-5-32. Assignment of application, permit, or license. Subject to the limitations provided in §§ 46-5-33 and 46-5-34, any application, permit, or license to appropriate water, including a permit issued under § 46-5-8.1, may be assigned, but no assignment is binding, except upon the parties thereto, unless filed for record with the chief engineer. No assignment may carry with it the right to use the water for any purpose or in any manner other than that specified in the application, permit, or license without the approval of the Water Management Board. Transfer of an application to appropriate water does not confer any right to use of water. The evidence of the right to use water from any works constructed by the United States, or its duly authorized agencies, shall in like manner be filed with the chief engineer, upon assignment. A sale, grant, conveyance, assignment, lease, or other transfer of a permit or license issued under § 46-5-8.1 may be assigned only in accordance with the terms of the contract or instrument of conveyance between the district and the energy industry user.

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South Dakota Water Law

46-6-3.1. Annual withdrawal of groundwater not to exceed recharge--Exception for water distribution systems. No application to appropriate groundwater may be approved if, according to the best information reasonably available, it is probable that the quantity of water withdrawn annually from a groundwater source will exceed the quantity of the average estimated annual recharge of water to the groundwater source. An application may be approved, however, for withdrawals of groundwater from any groundwater formation older than or stratigraphically lower than the greenhorn formation in excess of the average estimated annual recharge for use by water distribution systems.

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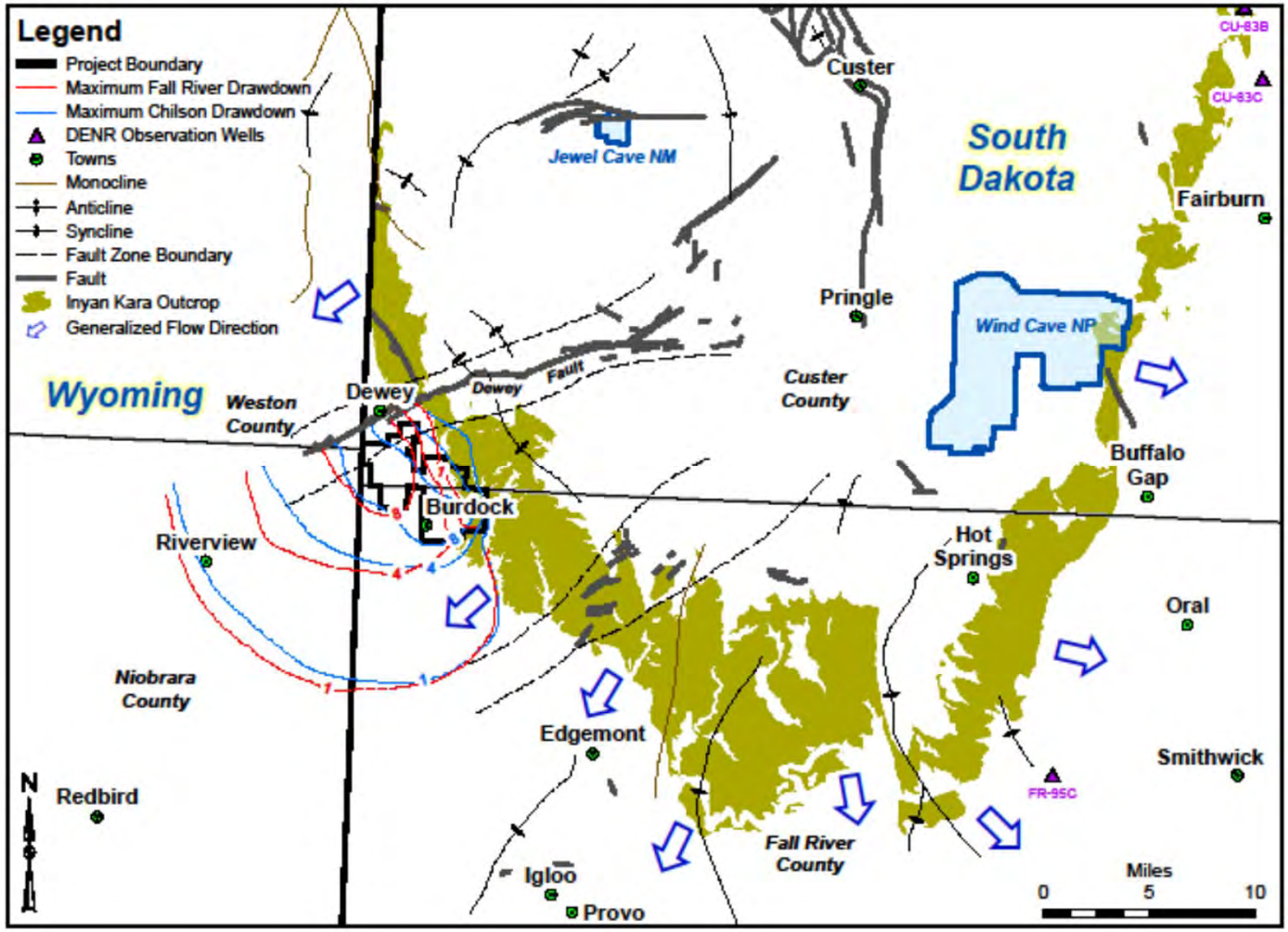
Maximum Drawdown
Fall River / Chilson



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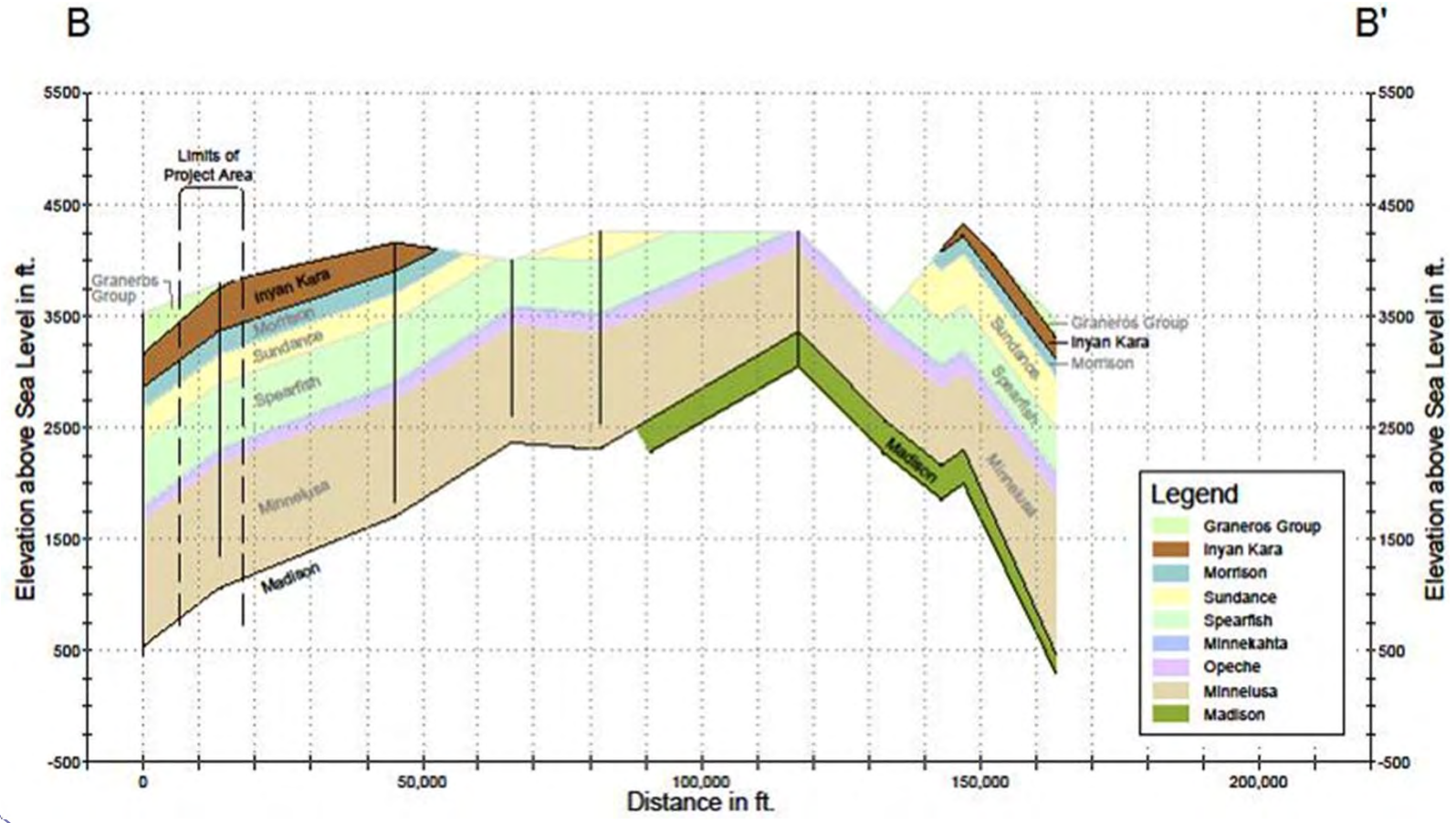
Southern Hills Cross Section



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Comparable Water Rights

- Rapid City – 97.3 cfs
- Hot Springs – 9.2 cfs
- Custer – 5.8 cfs
- Edgemont - 1.9 cfs
- Dewey Burdock – 1.6 cfs

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Rainfall vs Project Consumption

Project Annual Rainfall

Annual rainfall of 1.35 ft x 325,831 gal/acre ft x 11,800 acres
= **5,210,031,639 gal**

Project Annual Water Consumption

551 GPM
= **289,605,600 gal**

Project Consumption = .056 of Annual Rainfall

Annual Rainfall = 18 x Project Water Consumption

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Grazing Value vs Mining Value

Gross Annual Grazing Value

11,800 acres @ 40 acres/calf = 295 calves

295 calves @ $900 each = $265,500

Gross Annual Mineral Value

$800,000 lbs U308 @ $50 = $40,000,000

Gross Mining Value = 151 x Gross Grazing Value

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Agriculture & Uranium Extraction

We don’t have to make a choice.

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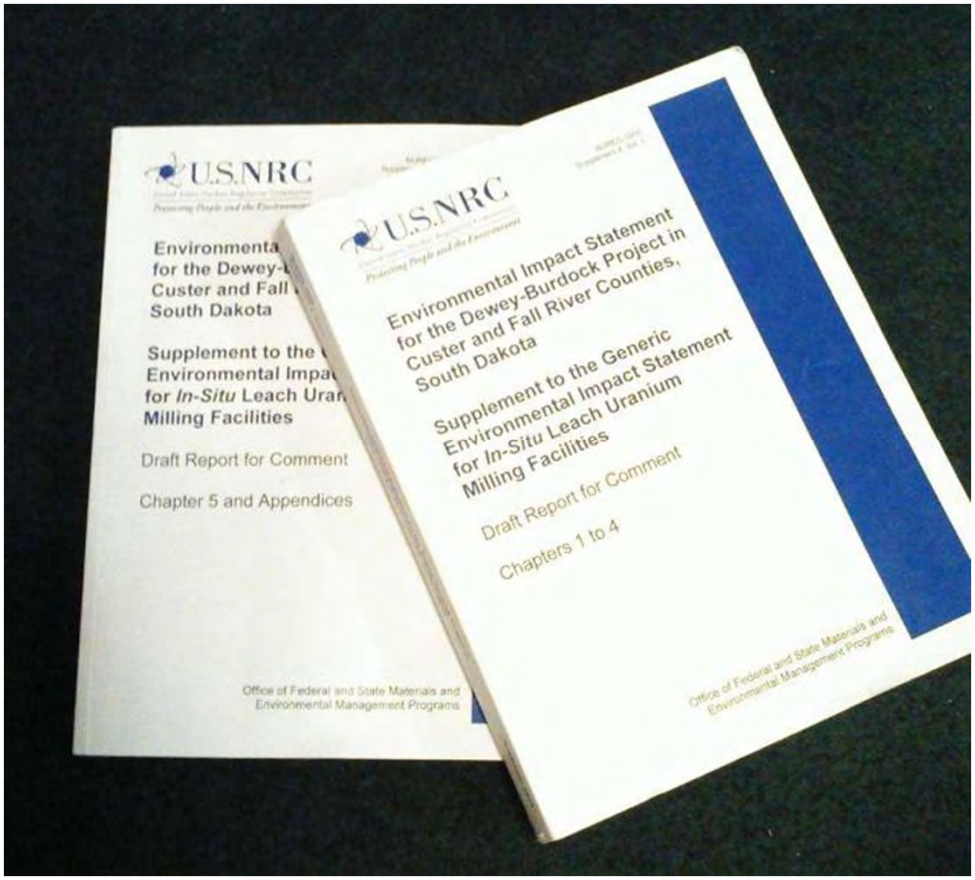
US Nuclear Regulatory Commission Supplement to the GEIS Dewey-Burdock Project



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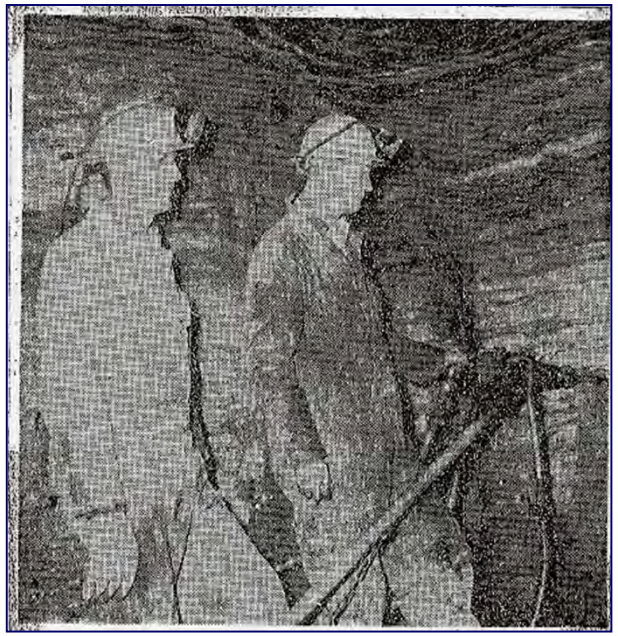
Comparing Early Conventional Mining



to Modern ISR

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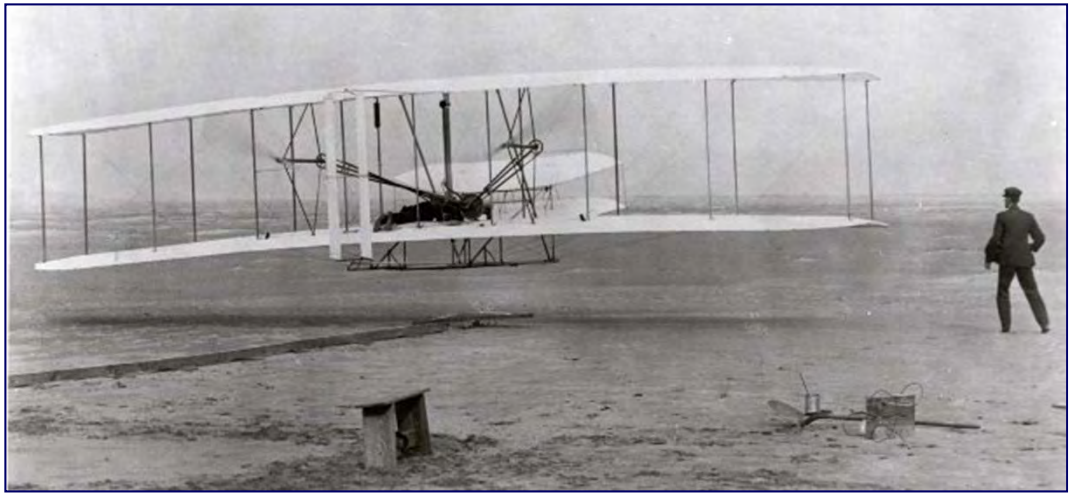
Is Like Comparing



A flight with the Wright brothers

to

A modern flight on a 747

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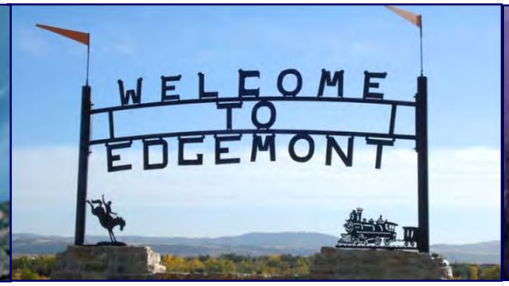
Economic Benefits

State of South Dakota

- Severance Tax
- Conservation Tax
- Sales & Use Tax

Local Governments

- Severance Tax
- Sales & Use Tax
- Property Tax
- Employment



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PLENTY OF SEATING AVAILABLE — This scene last Thursday afternoon during lunch at the Buglin' Bull Restaurant and Sports Bar is an all too common occurance around Custer in the winter, according to business owners. Many business owners struggle with whether or not to stay open in the winter months due to lack of business. [CCC Photo/**JASON FERGUSON**]

Running on empty

Businesses struggle with remaining open in the winter

By Jason Ferguson

For Cherish Baker, running Baker's Bakery during the winter months doesn't make a lot of sense. Mostly because if she is lucky, it only makes a few cents.

Baker is one of many Custer business owners who close up their store in the winter, opting for a few months of vacation rather than scraping by, usually in the red, during months when she says there aren't enough people in town to make keeping her restaurant open viable.

Whether it's a restaurant, a grocery store or a mechanic, business owners struggle to keep their heads above water when tourism season winds down.

"Unfortunately, there aren't enough people in this town to sustain (staying open)," Baker said. "It's just not worth it."

Now in her seventh year of owning the bakery, Baker said she stayed open over the winter for the first three years, but quickly figured out there was little, and usually no, money to be made in the winter.

"It's gotten worse and worse as the years have gone on," she said. "It would be great and I would love to stay open, even it if it was just to break even."

Baker said on the average day, 30 people would come into the bakery in the winter, compared to 300 in the summer. Expenses also rise in the winter, such as the cost of propane and electricity.

"I just opened my electric bill, and it was over $1,000, and that was with the place shut down," she said.

Steve Sallee, now in his third year as owner of Rushmore Automotive, can relate.

CLOSINGS/2A

Estimate of Economic Benefits
- Local Governments -

- **$50 million - Payroll**
- **$250 million - Other direct expenditures**
- **$185 million - Indirect expenditures**
- **$10 million - Severance taxes**
- **Additional $ for property taxes**

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Estimate of Economic Benefits
- State of South Dakota -

$7.6 million – Sales tax

$10 million – Severance tax

$1.1 million – Conservation tax

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Hollenbeck Ranch Life

The Cheyenne River is a quality of life as well as the swimming hole of choice for the Hollenbeck kids.

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