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## ADDRESSING CONNECTIVITY OF THE BP APPLICATION AREA TO THE FRUITLAND OUTCROP

TESTIMONY BY  
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Docket 0509-AW-16

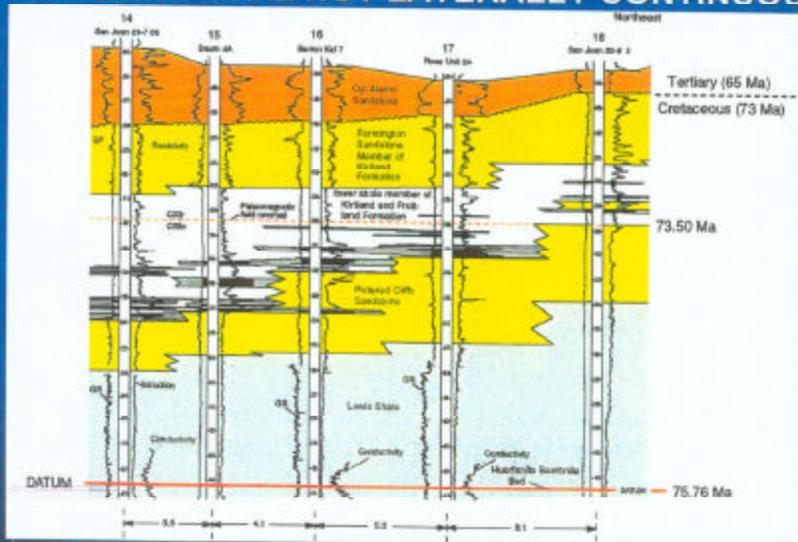
### CITIZEN CONCERNS

- BASINWARD WATER PRODUCTION DRAWS DOWN WATER TABLE AT OUTCROP
- DRAWDOWN AT OUTCROP PROMOTES COAL SEAM FIRES
- FRUITLAND WATER PRODUCTION REDUCES AVAILABLE GROUNDWATER IN WATER WELLS

## OBSERVATIONS

- FRUITLAND COALS ARE NOT Laterally CONTINUOUS OVER LARGE SCALE (>MILE)
- DATA IN BP'S APPLICATION ILLUSTRATE FRUITLAND COALS NOT CONNECTED OVER SMALL SCALE (<MILE)
- GEOCHEMICAL DATA SHOW FRUITLAND WATER IN APPLICATION AREA NOT CONNECTED TO OUTCROP
  - THREE INDEPENDENT GEOLOGIC CLOCKS USED TO DATE FRUITLAND FORMATION WATER
    - Radioactive Chlorine  $^{36}\text{Cl}/\text{Cl}$
    - Radioactive Iodine  $^{129}\text{I}/\text{I}$
    - Radioactive Helium  $^4\text{He}/\text{He}$
  - GEOLOGIC CLOCK DATA AGREE WITH ONE ANOTHER
- APPLICATION AREA IS FAR REMOVED FROM STEEP OUTCROP FLEXURE ZONE AND OUTSIDE BUFFER ZONE

## FRUITLAND COAL NOT Laterally CONTINUOUS

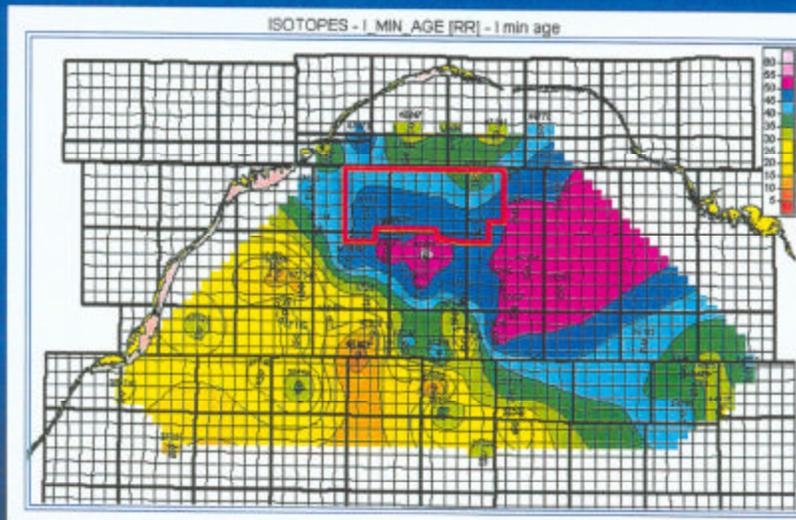


Fassett, J.E. 2000. Geology and Coal Resources of Upper Cretaceous Fruitland Formation. In Kirschbayer, M.A., L.N.R. Roberts, and L.R.H. Blewick, Geologic Assessment of Coal in the Colorado Plateau, Arizona, Colorado, New Mexico, and Utah. United States Geological Survey, Professional Paper 1625-B.

## INDEPENDENT DATING METHODS

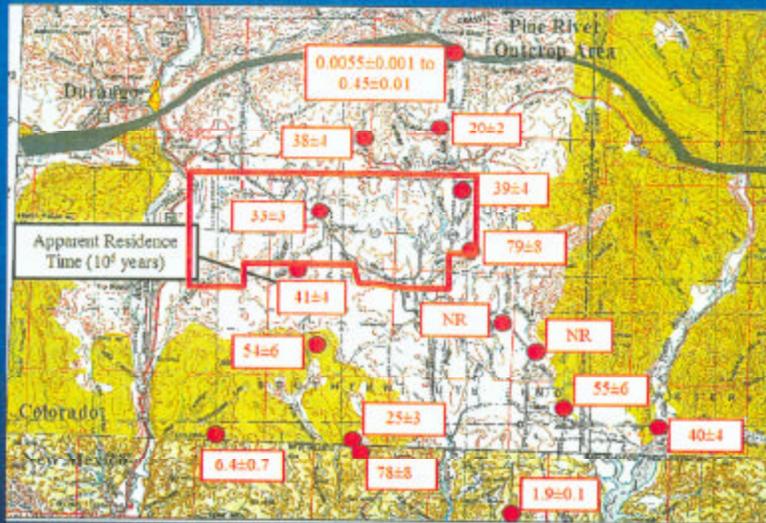
- LOSS OF PARENT PRODUCT THROUGH RADIOACTIVE DECAY
  - $^{129}\text{I}/^{127}\text{I}$ 
    - Half Life 15.7 MY;
    - 80 MY CLOCK
- GAIN OF DAUGHTER PRODUCT THROUGH DECAY
  - Uranium ( $^{238}\text{U}$ ), Actinium ( $^{235}\text{U}$ ), and Thorium ( $^{232}\text{Th}$ ) decay  $\rightarrow$   $^4\text{He}$ 
    - Accumulation Rate  $2.90 \times 10^{-10}$  mol/m<sup>3</sup>/yr

### $^{129}\text{I}/\text{I}$ AGE DATING SHOW BASINWARD FORMATION WATERS ARE OLD

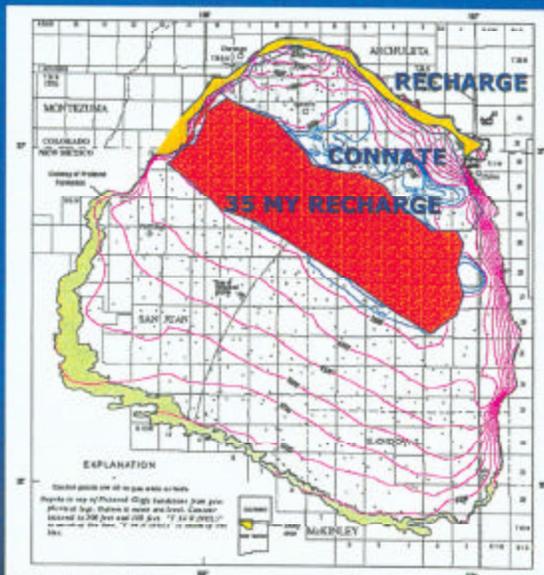


G.T. Snyder, W.C. Riese, S. Franks, U. Fehn, W.L. Peltzman, A.W. Gorodt, and J.E. Moran (2003) Source and history of waters associated with coal-bed methane:  $^{129}\text{I}$ ,  $^{36}\text{Cl}$ , and stable isotope results from the Fruitland Formation, CO and NM, *Geochimica et Cosmochimica Acta*, 67, 4529-4544.

**RADIOACTIVE HELIUM-4 DATA AGREE WITH RADIOACTIVE IODINE DATA**



Sarek, P.D., 2003, Evaluation Of Helium-4 In A Coalbed Methane System, And Implications For Regional Hydrogeology, Fruitland Formation, Colorado And New Mexico, Masters Thesis, CO State Univ., 75 pp.



**GENERALIZED WATER TYPES BY AGE**

RECENT RECHARGE NEAR HINGE TO OUTCROP BELT CORROBORATED BY <sup>36</sup>Cl/<sup>37</sup>Cl DATING

G.T. Snyder, W.C. Riesk, S. Franks, U. Fehn, W.L. Peizmann, A.W. Gorody, and J.E. Moran (2003) Source and history of waters associated with coal-bed methane, 1291, 36Cl, and stable isotope results from the Fruitland Formation, CO and NM, Geochimica et Cosmochimica Acta, 67, 4529-4544.

## DATING RESULTS SHOW 3 WATER GROUPS

- UPLIFTED BASIN MARGIN SHOWS EVIDENCE OF RELATIVELY RECENT RECHARGE (<5 KM OR 2.7 MILES) FROM THE OUTCROP)
- BASIN CENTER (MOST OF APPLICATION AREA) CONNATE
- THE DEEP BASIN IS CONFINED AND HAS BEEN STATIC FOR MILLIONS OF YEARS
- PRODUCTION FAIRWAY RECHARGED 35 MYA

## SUMMARY

- GEOLOGIC AND ENGINEERING EVIDENCE SHOWS COALS ARE NOT Laterally CONTINUOUS IN APPLICATION AREA ON EITHER REGIONAL OR LOCAL SCALE
- GEOCHEMICAL DATING SHOWS FLUIDS IN APPLICATION AREA ARE OLD, CONNATE
- NO COMMUNICATION WITH OUTCROP LIKELY DURING PRODUCTION

Riese, W.C., Pelzman, W. L., and Snyder, G. T., 2005, New insights on the hydrocarbon system of the Fruitland Formation coal beds, northern San Juan Basin, Colorado and New Mexico, USA in: Warwick, P. D. (ed.), Coal Systems Analysis: GSA Spec. Pap. 387, p. 73-111.