THE CENTRAL FLINDERS RANGES - ADELAIDE GEOSYNCLINE PROBLEM

Eric A. Rudd

I have written down my interpretation of the geologic conditions that exist and are related to the testing of the Blinman Diapir and Dome as well as the other areas covered by exploration tenements held by Frontier Exploration Limited.

This is partly to help me sort out my own ideas and partly to see where other people agree or disagree. To simplify the discussion I have used the terms:

"Area of Interest" referring to that section of the Adelaide Geosyncline lying between Lat. 30°30 and 32°

"Major Structure" referring to the major anticline extending from the southern end east of Wilpena Pound to the northern end east of Beltana.

I have divided the discussion into paragraphs seeking agreement or disagreement or discussion on each point.

1. The environment at the time of deposition of the Callanna Group of sediments.

(a) The area west of the Area of Interest included the Archean Basement, the Huchinson Group and a wide variety of intrusive and extrusive rocks such as the Moonta Porphyry, the Gawler Range Volcanics, the Gairdner Dyke Swarm and Beda Volcanics.

(b) This was probably a rich metallic province.

2. The Callanna Group.

(a) Most of the material in the Callanna Group sediments were derived from the western source.

(b) The sediments include carbonate and clastic rocks with evidence of evaporite

minerals.

(c) The sediments are a typical evaporite sequence.

(d) The sediments are predominantly shallow water deposited.

(e) They are continental rather than marine.

(f) Where seen in outcrop or as breccia in diapirs the sediments although lithified and subject to diagenesis have not been noticeably metamorphosed.

(g) These sediments could have produced hydrocarbons.

3. The Burra Group.

(a) Evidence of glacial Burra sediments are not known in outcrop or as brecciated fragments in the Blinman Dome or Diapir.

(b) The Burra Group is missing at this locality,

(c) or is only thinly represented.

(d) The Area of Interest has been uplifted after or during Burra Group time and the sediments removed by erosion prior to Umberatana time.

4. Umberatana Group.

(a) These are shallow water sediments so that if the area had been uplifted before Umberatana time the basin had subsequently been levelled again.

5. Structure.

(a) The Major Structure within the area of interest is different from and somewhat unique in the structural character of the Adelaide Geosyncline.

(b) The Structures of the Southern Flinders are generally more elongated and subject to overthrusting.

(c) They swing east south of the Major Structure.

(d) The structures of the Northern Flinders tend to be more complicated, broken and overthrust.

(e) They swing away from the northern end of the major structure.

(f) The Major Structure is a broader, gentler, dipping structure (excluding near diapirs) and shows less signs of major thrusting.

(g) The area of the Major Structure was subsequently involved in the Dalamerian orogeny.

(h) If the Dalamerian folding is removed from the present Major Structure there is very little structure remaining at the Burra - Umberatana time level.

(i) Most of the structure now mapped in the Major Structure has been imposed in Dalamerian time.

(j) This is supported by the continuation of shallow water sediments through Umberatana and Wilpena Group times without major unconformities.

(k) The uniqueness of the major structure is related to

(i) A post Burra Group uplift.

(ii) Some different bedrock configuration related say to lineament corridors.

(iii) The presence of a thicker evaporite sequence during Callanna Group time in the Area of Interest.

6. The intrusive breccia bodies.

(a) These are diapirs and not diatremes.

(b) The movement in the diapirs was relatively slow and continued over a long

geologic period.

(c) The diapirs were caused by the movement of massive salt bodies.

(d) These originated near the base of the Adelaide series (plucking bedrock) and predominantly involved Callanna Group sediments.

(e) The salt layers extended through the Area of Interest.

(f) The structural pattern of the Adelaide Geosyncline is due to the interplay of tectonic forces and the properties of the salt horizon (flow characteristics and low specific gravity).

(g) It is considered that the combination produced the present structural conditions and the diapirs.

(h) The carbonate and siltstone sediments of the Callanna Group were well consolidated and lithified before brecciation and transport by the diapir mechanism.

(i) The sediments of the Umberatana Group were well consolidated and lithified in the near horizontal position before being broken and upturned by the Blinman Diapir.

(j) The salt material was highly "plastic" and could take advantage of any weaknesses such as joints and faults in its upward movement.

(k) Barites was a part of the salt diapir system which moved with the other salts but being insoluble has survived.

(l) The salt body was able to form salt "pillows" in uplifted strata, as at Martins Well Dome, or to form diapirs at points of weakness such as the crest of anticlines or domes.

(m) The salt moved with the structure rather than "produced" the structure.

(n) The breakthrough of diapirs on the crest of "intact" structures such as anticlines or domes would have occurred when the buoyancy of the salt overcame the loading factors of the sediments.

(o) The presence of tension or extension faulting during folding could have accelerated the breakthrough.

(p) Most of the structure in the Major Structure was imposed in Dalmerian time so that "breakthrough" at Upalinna and Blinman Domes are related to this time.

(q) The Area of Interest has been exposed to various periods of erosion and weathering both before and after Dalmerian time so that extensive solution of salt has occurred in breached Callanna strata and in piercment salt structures.

(r) Not all the salt in unbreached structures and at depth in diapirs has been dissolved out.

(s) It is possible to intersect salt deposits at depth in the the area of interest.

(t) The best localities to test for salt is in unbreached structures where the salt is less complexly disturbed.

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