



Denison Mines Corp.

(DML-T, DNN-US)

SECTOR: Mining

STOCK PRICE
\$0.57
BUY
RATING
TARGET PRICE
\$1.60
RISK
Very High

HYDROGEOLOGICAL MODEL SIMULATIONS DEMONSTRATE “PROOF OF CONCEPT”

Simulations with Independent Model Validate ISR Concept at Phoenix

OUR TAKE: The independent hydrogeological modelling and simulation report on the Phoenix deposit, part of Denison's 90%-owned Wheeler River Project, concludes that Denison has achieved "Proof of Concept" for in-situ recovery (ISR) extraction techniques with respect to injection/extraction rates. The conclusions of the report serve to significantly de-risk the 2018 Pre-Feasibility study (PFS) on the Wheeler River Project (includes the Phoenix deposit). The 2018 PFS was completed prior to installation of the advanced test wells at Areas 1 & 2 of the Phoenix deposit. The independent work integrates "actual well field testing" data completed since the PFS, and should be more robust/reliable, confirming hydrodynamic assumptions of the PFS (flow/permeability).

KEY HIGHLIGHTS

- ◆ **Wellfield Simulation with Independent Hydrogeologic Model Overview.** The wellfield simulation was based on an independently developed hydrogeologic model that integrated the dataset from the 2019 field test program, which included 19 test wells installed at Phoenix Zone A, test areas 1 & 2. The "Proof of Concept" conclusion was reached **without any optimization work regarding well spacing, injection pressures, recoveries, permeability enhancement.** There is already support from field data (as we reported on [February 19th](#) and [February 24th](#)) that uranium recoveries may ultimately be better than those assumed in the PFS and, similarly, permeability enhancements possible via MaxPERF drilling, have the potential to improve permeability, with implications on flexibility with regard to flow rates/pressures. In that context, the positive results of the simulation are not only de-risking, but are likely to be improved upon with refinement and collection/integration of additional data.
- ◆ **Simulation Scope and Alignment with 2018 PFS.** The simulation was designed to model 33 injection wells surrounding 18 extraction wells in a typical '5 spot' ISR pattern with 10 metre spacing from injector to recovery well, deployed over test areas 1 & 2 at Zone A. The simulation integrates multiple hydrogeologic models designed around the variations in lateral and vertical differences in hydraulic conductivity. **The summary results of the testing are in the order of magnitude of the PFS assumptions, which is very encouraging.**
- ◆ **Flow Rates & Hydraulic Conductivity Consistent with PFS.** In the simulation the average days to travel the flow path from injection to recovery well was 55 days. This suggests a rate of hydraulic conductivity of 0.18 m/day vs the PFS assumption of 0.086m/day and Test Area 2 actual test results ranging from 0.033 to 0.084 m/day. For the 51-well simulation the average extraction flow-rate of 105.5 gpm was similar to the production scale assumption of the PFS production plan which was based on achieving an average flow rate of 500 litres per minute (or 132 gpm) through the well field (at ~145 psi differential). Although the press release did not make these comparisons, our quick assessment suggests the simulation, combined with earlier hydraulic conductivity and permeability test results, are very encouraging and should support what's outlined in the PFS. There are many factors that will vary continuously as eventual mining progresses, but preliminary data continues to suggest enough flexibility within key parameters that, on balance, should be capable of delivering PFS-level performance or better.
- ◆ **2020 Work Program to Focus on Augmenting the Test Area 1 & 2 Database.** Summer and fall technical work will include further hydrogeological field testing at Test Areas 1 & 2 at Phoenix. This work is part of building out the most complete database possible on key parameters of the test areas (fluid paths, permeability enhancement, etc.) to augment and further calibrate the simulation and plan future test programs ahead of a future full Feasibility Study.

RECOMMENDED ACTION

We recommend adding exposure to Denison given our thesis that technical work will continue to de-risk Phoenix

- ◆ **Attractive entry point as risk/reward proposition improving.** Denison is making significant progress de-risking an unconventional approach to mining Phoenix. Technical work is yielding great results and success in further testing should see DML shares shed additional risk discount. The possibility of a future in-ground lixiviant test or ISR demonstration would be a major catalyst and de-risking milestone for the concept.

KEY STATISTICS AND METRICS		HAYWOOD ESTIMATES (CAD)			VALUATION	
52-Week High/Low	\$0.72/\$0.24		2018A	2019A	2020E	Our target is based on a corporate NAV sum-of-parts assessment of Denison's full suite of interests, including a DCF _{10%} assessment of future production from the Wheeler River project and other credits. Net of corporate adjustments, our NAV is \$1.60 billion, or \$1.60 per share.
YTD Performance	5.6%	Revenue (\$M)	\$15.6	\$15.5	\$10.5	
Dividend Yield	N/A	U ₃ O ₈ Production	-	-	-	
Shares O/S	626M	EBITDA (\$M)	(\$15.5)	(\$14.9)	(\$6.1)	
Market Capitalization	\$357M	CFPS (\$/share)	(\$0.04)	(\$0.03)	(\$0.02)	
Cash	\$4.9M					
Debt	NIL					
Enterprise Value	\$352M					
Daily Volume (3 mos.)	647,064					
Currency	CAD					

Figure 1. Phoenix ISR Field Test Areas Overview

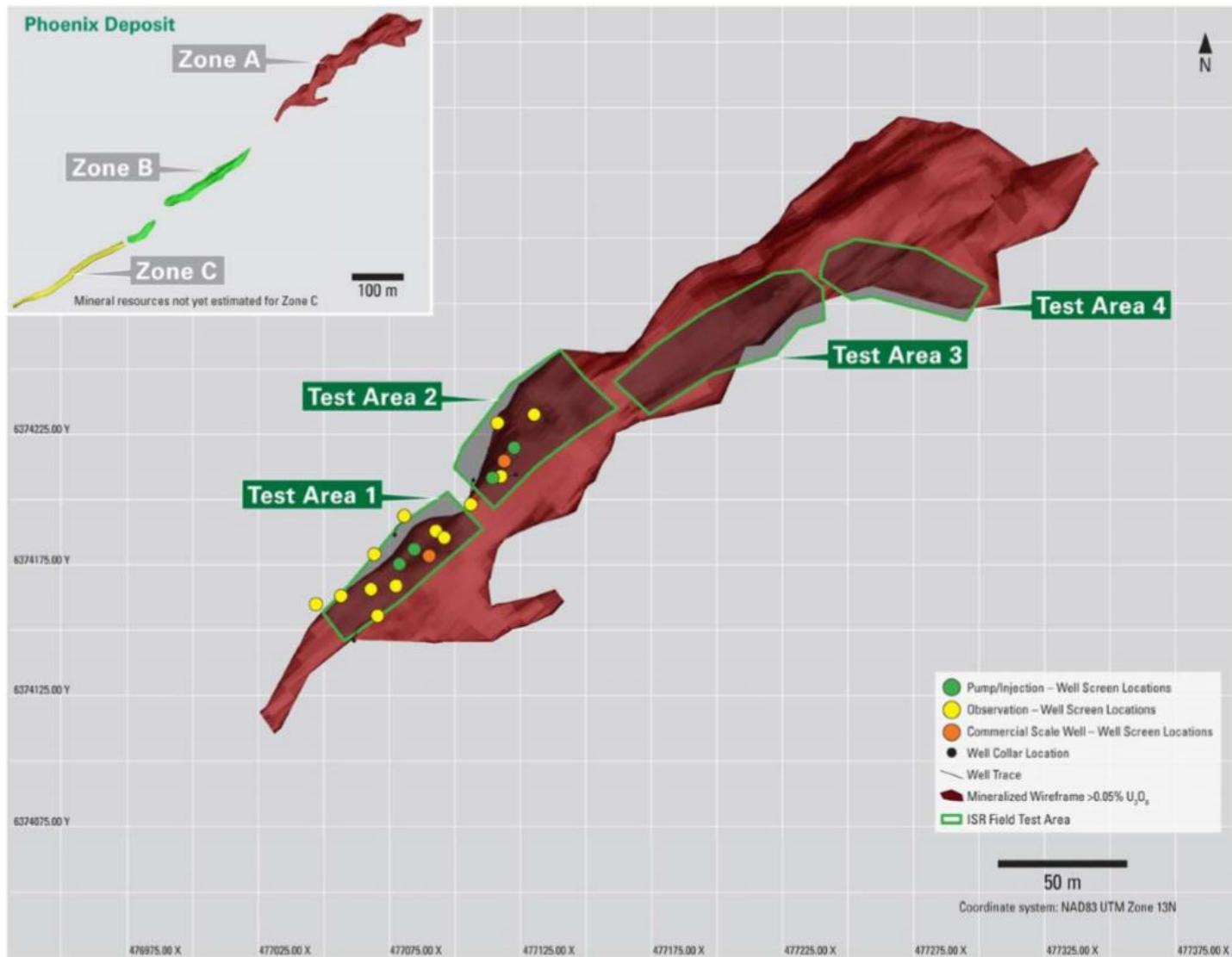


Figure 2. Test Area 2 Long Section – Well Screen Locations

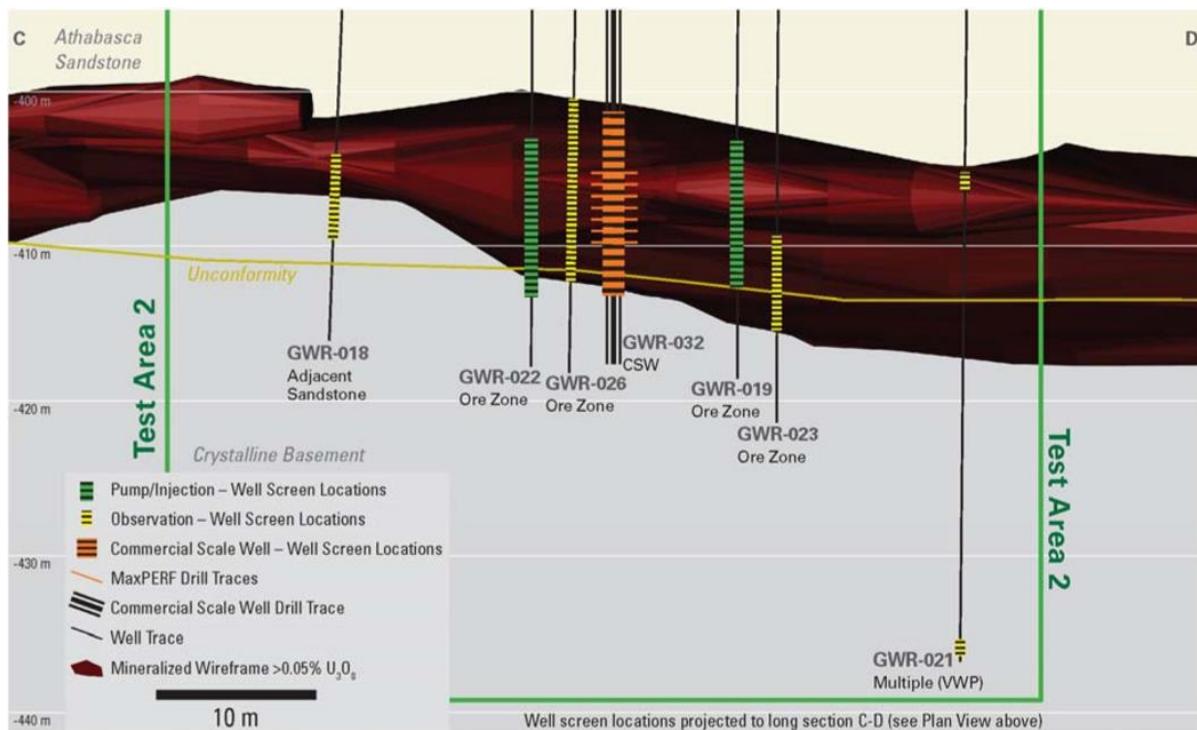
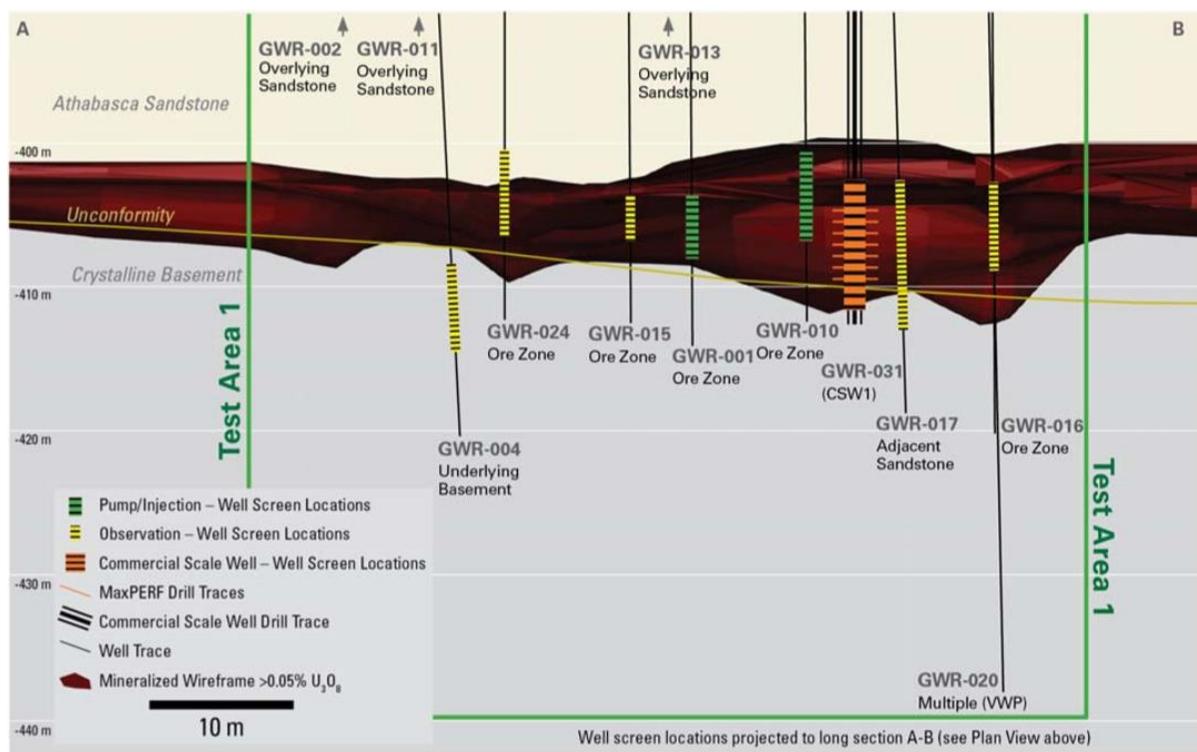


Figure 3. Test Area 1 Long Section – Well Screen Locations



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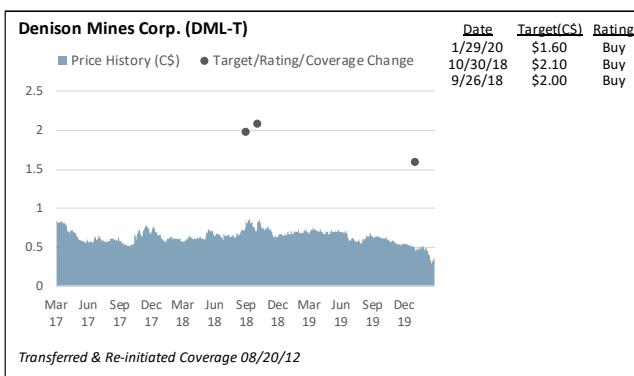
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- ◆ n/a

Distribution of Ratings (as of June 5, 2020)

		IB Clients (TTM)	
	%	#	
Buy	60.8%	59	82.6%
Hold	12.4%	12	8.7%
Sell	0.0%	0	0.0%
Tender	1.0%	1	0.0%
UR (Buy)	1.0%	1	0.0%
UR (Hold)	0.0%	0	0.0%
UR (Sell)	0.0%	0	0.0%
Dropped (TTM)	24.7%	24	8.7%

Price Chart, Rating and Target Price History (as of June 5, 2020)



B: Buy; H: Hold; S: Sell; T: Tender; UR: Under Review

Source: Capital IQ and Haywood Securities

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