

## Fields of Brown

by Dave Forest  
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We spend a lot of money looking for mines.

Drilling, trenching, sampling, assaying, metallurgical testing, running geophysical surveys, taking soil geochemistry samples. All of these things are necessary to locate ore deposits that will become tomorrow's suppliers of metals. And all of these things are expensive.

My friend Tim Searcy from Wellington West Capital Management just forwarded some interesting research on exploration spending, pointing out that over \$13 billion was spent looking for ore deposits in 2008.

What's interesting is *where* this money is allocated.

There are different kinds of mineral projects. There are grassroots projects, where a geologist gets a conceptual idea about where a deposit might be and spends money to see if, in fact, there is mineralization there.

Advanced projects, where a company has already confirmed the existence of mineralization. And now spends money to determine *how much* mineral there is. And whether the quality of mineralization makes for an economic mine.

Around the world, roughly equal amounts of money are devoted to these two project types each year. Tim estimates that in 2008 there was \$5 billion spent on grassroots projects, with an additional \$5.4 billion spent on advanced prospects.

But there's a third type of exploration project. Near-mine. Also known as brownfields exploration.

Brownfields projects are those where a company has an already-operating mine and explores for additional ore below or proximal to the identified ore body.

Brownfields projects are attractive because the presence of mineralization has already been confirmed in an area. Which increases the odds of making a discovery in a near-by but unexplored place. If the conditions for creating economic mineralization existed at this spot, there's a decent chance they existed 500 meters to the south of here. Reducing exploration risk.

Another risk-mitigating factor for brownfields projects is that companies can apply existing knowledge about a mineral system.

Once a mine is built, a large amount of geological data has already been collected, and controls on mineralization are (hopefully) understood. If close-by deposits were created by the same fluids, structures, etc., an exploring company can use its knowledge base to better target their work. Meaning less wasted money and higher probabilities of finding something.

Brownfields projects are also attractive because they don't have to achieve as high a degree of success in order to provide economic benefits.

Let's take a closer (and highly simplified) look at how this works. Imagine a gold mining company that makes two discoveries. Both are in new areas. The first deposit contains 100 million tons of ore grading 0.6 grams per ton gold. The second has 100 million tons also, but at 0.8 grams per ton grade.

Both deposits are in the same region, and projected mining and processing costs are \$12 per ton of ore. The cost to build a 30,000 ton-per-day mine at either spot is \$350 million.

The company now crunches the numbers. At 0.6 g/t, the first deposit will yield an operating profit around \$3.50 per ton (assuming 90% gold recovery and \$900 gold price).

But even though the mine runs positive cash flow, the economics don't work. Over the mine's life, it only produces \$250 million in discounted cash flow (at an 8% discount). After paying \$350 million to build the operation, the operator loses a net \$100 million. This deposit would go undeveloped.

The higher-grade prospect, however, looks pretty good. At 0.8 g/t, each ton of ore yields a profit of almost \$9. Over the whole mine life, the operation produces discounted cash flows of \$650 million. Paying back the \$350 million in building costs and providing \$300 million in profit. Green-light this one.

That's fairly straightforward. But now suppose the higher-grade mine is nearing the end of its life. The 100 million tons of ore is almost gone.

Embarking on a brownfields exploration program, the company discovers a deposit a few hundred meters away. This brownfields discovery is 50 million tons at 0.55 g/t.

Even though this discovery is smaller and lower-grade than the uneconomic 0.6 g/t deposit, this one can be produced.

At 0.55 g/t, each ton of ore processed yields a profit of \$2.50. And because most of the facilities for mining and processing the ore have already been built and paid for, the additional capital cost is very low. Perhaps only \$50 million for pre-stripping and road building.

Using these numbers, the brownfields deposit produces a net profit of \$50 million. Go ahead and mine.

Because of these improved economics, the hurdle for an economic deposit is much lower in a brownfields setting. Smaller and lower-grade ore bodies can make money. And because more deposits fit the bill, the chances of successful exploration (*i.e.*, resulting in an economic discovery) are greater.

The attractions of brownfields work are not lost on the world's major mining companies. Tim's report I mentioned above estimates that majors spend 40% of their exploration budgets on near-mine projects.

Just last week, partners BHP, Xstrata and Teck Resources announced they will spend \$1.3 billion to produce newly-discovered ore at Peru's long-running Antamina zinc-copper mine. Even though this is an old mine, ore reserves were increased by 75% in 2008. Largely due to brownfields exploration success.

The world's biggest copper producer, Chile's Codelco, also likes the brown these days. The company announced last week it will spend \$2.3 billion this coming year to tap new reserves at existing mines. You don't need to go far to find new ore.

The flip side of this coin is that as majors focus more on brownfields, they let greenfields exploration slide. Many majors have cut or completely eliminated their budgets for spec exploration over the past few years. Exploring in unproven areas is simply too costly and too risky.

But greenfields discoveries are critical to the mining business. There's only so much you can expand existing mines. Eventually you need to find new deposits and new districts.

Meaning there's an ever-developing niche for junior companies that can bring fresh exploration ideas to the table. These are the kind of outfits majors will do joint-venture deals with. Bigger companies are okay with spending on good projects. They just don't want to pay the overhead to come up with the ideas themselves.

For the few (and I mean few) teams proficient with generating exploration targets this is very good news. Good ideas are going to be worth more and more going forward.

Here's to what brown can do for you,

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