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February 2017

# Northern Dynasty Minerals Ltd. (NAK)

## *Cu at Zero*

We are short shares of Northern Dynasty Minerals, a Canadian company that owns an undeveloped copper and gold resource in Alaska called the Pebble deposit. Discovered decades ago but never mined, the Pebble deposit has inspired intense controversy, as a broad and bipartisan coalition including environmentalists, Alaska Natives, and commercial fishermen fought its planned development, leading the Environmental Protection Agency in 2014 to stop the project in its tracks. The election of Donald Trump, however, has fueled hopes that a more mining-friendly EPA will allow the project to move forward. Since Election Day, Northern Dynasty's stock price has increased 326% amid a host of promotional campaigns. As one observer put it on January 20th, "This is getting a little ridiculous. I don't think I've ever seen a single mining stock as aggressively endorsed by investment newsletters as Northern Dynasty has been over the past few months."

All this enthusiasm is misplaced. We believe Northern Dynasty is **worthless**. Though the legal and regulatory problems that will continue to plague the Pebble project even under a Trump presidency are enormous, the project's Achilles' heel is more fundamental: economics. Large players in the mining industry, including Teck, Mitsubishi, Rio Tinto, and Anglo American, invested in Pebble years ago; one by one, they all abandoned it. Northern Dynasty itself was reportedly "on an aggressive sales push" to rid itself of the asset back in 2011. Why?

Based on our discussions with multiple people directly involved in planning the Pebble project, we believe the answer is simple: the upfront capital costs necessary to build and operate the mine are so onerous that the mine isn't commercially viable. Indeed, Anglo American – Northern Dynasty's former partner on the Pebble project, before it exited in 2013 – concluded that, under a range of scenarios and despite years of attempted optimization, building the mine would **destroy** billions of dollars of value. (Moreover, Anglo drew this conclusion based on assumed selling prices for key metals that are significantly *higher* than such prices today.) According to our sources, Northern Dynasty knew about the negative results of Anglo's analysis but cut it short to avoid having to disclose it to the public – pursuing what one engineer described to us as "a hidden agenda of telling a good story."

Even if the Pebble project were commercially viable, it would still face daunting odds. A majority of Alaskans – Republicans, Democrats, and independents – oppose the project and recently voted 2-to-1 to give the state legislature an effective veto over its construction *even if* it ultimately receives federal and state permits. Moreover, the EPA has the power to shut down the mine at any time, even after permitting – a likely outcome under any future Democratic administration. With no economic value and huge political risks, Northern Dynasty is a zero.

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# I. Investment Highlights

**The Pebble deposit is not commercially viable**. Though very large, the Pebble deposit is relatively low-grade, meaning that large amounts of raw material would need to be processed to extract small amounts of valuable substances like copper, gold, and molybdenum. But this processing requires a great deal of infrastructure, and the pristine Bristol Bay region where Pebble is located has almost none. Mining Pebble would thus entail building a large power plant, a deep-water harbor, an 86-mile-long road, an equally long set of pipelines for moving copper concentrate, multiple dams that would rank among the largest on the planet, potentially a floating liquefied natural gas platform, and more – all in a harsh natural environment subject to extremes of temperature and precipitation, not to mention earthquakes. Though, in the words of one person familiar with Pebble, Northern Dynasty consistently "tried to underplay the issues," in reality the project was, in the words of another, "pushing the boundaries of engineering. Actually it's quite an interesting project due to all the challenges…but from an investment perspective it's obviously risky."

Sure enough, in 2013 Anglo American, Northern Dynasty's former partner, withdrew from the project, walking away from more than $500 million in sunk costs and making no effort to renegotiate the terms of its deal instead of simply exiting. Though some Northern Dynasty bulls now assume Anglo's decision stemmed entirely from regulatory concerns that will now abate, Northern Dynasty itself explicitly denied that the EPA had anything to do with it. Our discussions with people directly involved in the project confirmed that, as one crisply put it, **"Anglo exited because of economics."**

Anglo personnel viewed Northern Dynasty's economic analyses as unrealistic and overly optimistic, even speculating that concern for the company's stock price was pushing Northern Dynasty management to make short-sighted choices. In Anglo's more sober view, Pebble's upfront capital costs would be *more than 100% higher* than what Northern Dynasty has suggested, while operating costs would be roughly 20% higher. These differences amounted to many billions of dollars, which – for a project that Northern Dynasty's own 2011 preliminary assessment accorded an after-tax NPV of only $4 billion[1] – easily drove the value of the project into negative territory, even before adjusting for its unusual regulatory and reputational risks. We believe Northern Dynasty knew about Anglo's analysis but suppressed it; as one source told us (and a second source confirmed), "What's interesting is, as we were about to issue our PFS [pre-feasibility study] that we came up [with] in 2012 or so, they [Northern Dynasty] stopped us finishing that PFS. We weren't supposed to issue the report, you see. We were coming up with 13 billion in capital."

[1] See Table 18.8.24, using the "45-Year Reference Case" and long-term metal prices as defined in the assessment.

In short, one of the world's largest and most experienced mine operators concluded after years of study that the Pebble project was so unlikely to earn its cost of capital that it wasn't worth trying; one Anglo executive ruefully complained, with hindsight, that "he would never have touched Pebble at all." Indeed, every large mining player that has ever become involved with Pebble has either abandoned it or attempted to – including Northern Dynasty. President Trump's EPA may be easier on the mining industry than President Obama's, but it can't make a success out of a value-destroying boondoggle.

**The Pebble project continues to face immense political risks**. To be sure, the specific step that the EPA took in 2014 to halt Pebble's development – a preemptive "veto" under Section 404(c) of the Clean Water Act, which authorizes the agency to block specified areas from serving as waste disposal sites in order to prevent "an unacceptable adverse effect on…water supplies…and fishery areas" – was unusual and aggressive. Trump's as yet unconfirmed nominee for EPA administrator, Scott Pruitt, has criticized (and sued) the agency for overreaching. He may indeed entertain the notion of dropping the veto and allowing Northern Dynasty to apply for the many necessary federal, state, and local mine-construction permits in the ordinary fashion.

However, even if Northern Dynasty does manage to apply for permits – something it's claimed it was on the verge of doing for more than a decade – the road forward is long and treacherous. While the company now suggests that the permitting process will take three to four years,[2] the Pebble partnership's former CEO said (before the EPA veto) that it would take four to five years,[3] while a former high-level EPA official we spoke to predicted "probably a lead time of six to seven years before you really know whether you have a project or not." In the words of the deputy commissioner of Alaska's Department of Natural Resources, "The permitting process for Pebble will be a big challenge. I don't think there's any doubt that it will be the largest, thickest environmental impact statement ever done in Alaska, maybe the nation, maybe the world."[4]

Even if Pebble can obtain the necessary permits from federal and state agencies, it faces several additional stumbling blocks. In November 2014, 66% of Alaskan voters voted "yes" on a ballot measure aimed squarely at Northern Dynasty that requires the *legislature* – not just executive agencies like the Department of Natural Resources that tend to favor mining interests – to specifically determine that any "large-scale metallic sulfide mining operation located within the watershed of the Bristol Bay Fisheries Reserve…will not constitute danger to the fishery within the Bristol Bay Fisheries Reserve." If the legislature cannot agree to this conclusion, mining can't take place – permits or no permits. With Alaska's current governor[5] and speaker of

[2] See Northern Dynasty's January 2017 corporate presentation, slide 9.
[3] See the transcript of the 2012 Frontline documentary *Alaska Gold.*
[4] Ibid.
[5] See e.g. "Walker Against Pebble and EPA, Suggests 5% Agency Cuts," *Alaska Journal of Commerce*, October 15, 2014 ("'Based on what I know at this point I'm not in favor of Pebble,' Walker said during an Oct. 10 sit-down with Journal editorial staff").

the house[6] on the record (along with numerous other Alaskan politicians) as Pebble opponents, and with so many Alaskan citizens dead-set against the project, the potential for a legislative veto is very real. In fact, additional measures are already under consideration to add further state-level checks on the project, including possibly barring mine construction until key officials find "beyond a reasonable doubt" that Pebble would not jeopardize the local fishery – a staggering burden of proof given that the EPA has already judged the project to create "an unacceptable adverse effect."

Furthermore, just as a Republican EPA can withdraw a 404(c) veto, a Democratic EPA can reinstate it – at any time, forever. Under the Bush administration, for instance, Mingo Logan Coal Co. received a permit for the discharge of certain materials into streams in West Virginia, only to lose it within two years once the Obama administration took over – a measure recently upheld by the U.S. Court of Appeals as fully within the EPA's lawful powers. Given how quickly a change in political party triggered a change in policy even in the relatively obscure and minor case of Mingo Logan, we would expect the Pebble project, with its higher profile, grander scale, and deeper unpopularity, to be struck down promptly should the Democrats ever retake the presidency.

With little cash on its balance sheet and few people under its employ, Northern Dynasty needs massive financial and operational backing to even consider developing the Pebble deposit. But what potential partner would willingly bear such a wide range of unquantifiable and potentially catastrophic regulatory risks? More importantly, what potential partner would gladly incinerate billions of dollars of value by building a mine that can't produce an adequate return on capital? We believe that Northern Dynasty is on its own. It will never develop the Pebble deposit and has no other source of potential value; it's worthless.

[6] See e.g. "United Tribes of Bristol Bay Endorse Representative Bryce Edgmon for Re-Election," October 27, 2017 ("Bryce's record proves he stands with our communities when it comes to stopping the Pebble Mine and ensuring the protection of our traditional way of life").

## II. Company Overview

**Northern Dynasty: Capitalization and Financial Results**

| Capitalization | | | Financial results (CAD mm) | | | |
|---|---|---|---|---|---|---|
| | | | | 2014 | 2015 | 2016† |
| Share price (USD) | $3.18 | | Net income | $ (31) | $ (34) | $ (29) |
| Fully diluted shares (mm):* | | | Op. cash flow | (28) | (38) | (26) |
| Shares outstanding | 292.2 | | | | | |
| RSUs/DSUs | 1.1 | | | | | |
| Dilutive impact of warrants/options | 55.8 | | Cash | $ 9 | $ 8 | $ 8 |
| Total | 349.1 | | Shares O/S | 95 | 222 | 265 |
| Fully diluted market cap (USD mm) | $ 1,110 | | | | | |

**Pro forma for Northern Dynasty's recent equity issuance (at a price of $1.85 per share).*
*†2016 values represent, for net income and operating cash flow, annualized 2016 Q3 YTD results, and, for cash and shares outstanding, 2016 Q3 levels.*
*Source: company filings, Kerrisdale analysis*

Founded in 1983, Northern Dynasty formerly held an interest in a small-scale gold mine in Nevada but frittered its cash flow away on a long series of fruitless exploration programs, both under its old leadership and under the aegis of Hunter Dickinson Inc., a private firm that provides "management and administrative services" to companies in the mining sector. (Northern Dynasty remains part of the Hunter Dickinson "family" to this day, paying it ~$5 million a year and drawing most of its key decision-makers from Hunter Dickinson's ranks.)

In 2001, Hunter Dickinson acquired options on the Pebble deposit from the large mining company Teck (then known as Teck Cominco) and, in a complex series of transactions, ultimately transferred those options to Northern Dynasty. Over the next several years, Northern Dynasty paid Teck $14 million plus a 4-5% share of potential future mine profits to gain full control over Pebble. (Teck, which discovered the deposit in the late 1980s, could have opted to retain shares of Northern Dynasty or hold on to a much larger stake in the project itself; it chose to cash out instead.) But Northern Dynasty has never had the wherewithal to develop Pebble on its own, so, in 2007, it recruited Anglo American into what was now the Pebble Limited Partnership. Anglo was to supply the partnership with $1.5 billion in funding in exchange for 50% ownership. (In the end, Anglo only put in $573 million before it gave up on the project, thereby returning complete ownership to Northern Dynasty.)

Throughout this period, Northern Dynasty repeatedly said that it was on the verge of applying for the permits needed to begin mining, but the timeline shifted again and again. One vocal Pebble opponent, a Republican former state senator named Rick Halford, summarized what he called Northern Dynasty's "empty promises":[7]

[7] For brevity, we omit the URLs for the underlying sources, which can be found in Halford's written testimony.

- **2004** – (Nov 3) – Northern Dynasty Minerals (NDM) announces they expect "completion in 2005 of permit applications."
- **2005** – (August) NDM claims that "a full permitting process for a port, access road, and open pit mine [were] all slated to begin in 2006"
- **2007** - (October) - Pebble targets completion of a pre-feasibility study in December 2008, a feasibility study by 2011 and commencement of commercial production by 2015.…
- **2008** - (October) – Alaskans were assured that Pebble was on "schedule to finalize a proposed development plan in 2009 and, following input from project stakeholders, apply for permits in early 2010."
- **2009** – (March) – Pebble noted they were in the midst of "preparation to initiate state and federal permitting under the National Environmental Policy Act (NEPA) in 2010."
- **2009** - (September) – Preparing for project permitting under NEPA in 2010.
- **2010** – (Feb 1) – Pebble claims preparing to initiate NEPA permits in 2011
- **2010** – (May) – Pebble backtracks and now claims it will enter permit phase in 2012.…
- **2010** - (September) – Pebble CEO John Shively tells the Juneau Empire that Pebble is likely to start applying for permits in early 2011.
- **2011** – (May) – Pebble reports that "design process is nearing important milestones and that Pebble intends to enter the permitting phase toward the end of 2012."…
- **2011** – (June) – John Shively, CEO of Pebble, tells E&E news that Pebble should have a project proposal sometime in 2012 and be in permitting by late 2012, or early 2013.
- **2011** – (October) – Pebble about-faces and now claims . . ."We have never even said that we're going to seek a permit. We may not."…
- **2012** – (February) – Former Vice President of the Pebble Partnership told the State of Alaska House Resources Committee that Pebble would have a mine plan out within a year, moving to permitting by early 2013.
- **2013** - (June 2013) – Again on E & E News, Pebble CEO John Shively explains that he hopes "to have a project to take into permitting this year."
- **2013** – (March)– Senator Cantwell calls on SEC to investigate Pebble…
- **2013** – (November) – Ron Thiessen, CEO of Northern Dynasty, stated to the International Business Times, that "We can permit this mine. There's no question." "The heavy lifting is done and we have all of the data." Thiessen further stated that "Northern Dynasty will have permitting documentation done and ready to file by the first quarter of 2014"
- **2015** – (November) - "working toward the goal of submitting our initial project description for permitting" and "we're only just now preparing to apply for permits"

Internally, the EPA also perceived Northern Dynasty as unreliable. One former official told us, "They've never released the full plan. They may not have the full plan.…They would need that for a permitting application. When I was working on this, they were constantly saying, 'Slow down here – we're on the verge of releasing our mine plan and permit application to the Army Corps of Engineers.' It never happened."

As the development process dragged on with few signs of progress, a broad coalition of local and national interest groups became profoundly concerned that mining the enormous Pebble deposit would wreak havoc on the environment. The deposit is situated among the headwaters of the Bristol Bay watershed, home to one of the world's richest wild salmon fisheries, which in turn supports over 14,000 local jobs as well as traditional subsistence lifestyles for Alaska Natives. By 2010, the EPA had begun to consider intervening even before the much delayed permit applications appeared. In 2012, it issued the first draft of its Bristol Bay Watershed Assessment, which examined "potential impacts of large-scale mine development on Bristol Bay fisheries and consequent effects on wildlife and Alaska Native cultures in the region." Drawing on this assessment, in 2014 the EPA initiated the process of preemptively blocking the discharge of mining waste at Pebble, effectively vetoing the project. Before that veto process could come to its final conclusion, however, Northern Dynasty sued the EPA and won an injunction, putting the project's regulatory fate in limbo. The court case is currently stayed, pending mediation.

Enter Trump. After years of relentless bad news, Northern Dynasty could finally give investors hope. Management called Trump's victory a "game changer" and gushed, "The stars that were previously askew, they seem to be lining up." Others have taken this Trump thesis and run with it. One newsletter writer, Doug Casey, even claimed (falsely) that "on Friday, Jan. 20, President-elect Trump's first executive order will roll back one of President Obama's biggest mistakes" – namely the EPA veto of the Pebble mine. To be sure, there is a reasonable chance that Trump's EPA will take a softer line on the project, possibly dropping the veto and allowing Northern Dynasty to apply for permits. Maybe this time, unlike all the others, Northern Dynasty will actually apply instead of just talking about it. But all this frenzied political speculation misses the point. The reason that the Pebble project has languished for so long has less to do with regulation than with economics: the mine would be so expensive to build and operate that it wouldn't produce an adequate return.

## III. The Pebble Project Is Not Commercially Viable

### *Major Investors Repeatedly Walked Away from Pebble – and Not Because of the EPA*

> *Let me recap. Four real companies, a copper smelting company along with three actual mining companies, collectively spent 20 or so years and at least $700 million trying to come up with a profitable mine plan for the Pebble deposit. What else did Cominco, Mitsubishi, Rio Tinto and Anglo American spend all that money and effort on? What they learned was that the cost of power, port, access, and labor is prohibitive, water management is a nightmare, and when all that is combined with a very low grade*

*deposit, it isn't viable – even when gold and copper were at record highs. Remember how Pebble said in 2008 and every year thereafter that a mine plan was coming next year? It never came because they couldn't come up with one.*

—mining consultant and former Cominco environmental-affairs director Bruce Switzer, Alaska *Dispatch News*, October 1, 2014[8]

*If we* [Anglo American] *think 13* [billion dollars of upfront capital costs], *and the other guys are saying 4, if we're on the far side, you know, you could turn that down to perhaps 8 to 10, but to turn it down to 4 is just getting to the art of the ridiculous. It's just too close to the bone. I mean, you'll battle to operate a plant like that – especially in a remote environment where weather conditions are not easy to deal with in the best stretch.…We were always fighting them on the basis that they thought this could be easier.… I mean, we live in the real world.…The reality is, is that practical? I don't think so.*

—engineer formerly involved with the Pebble project

While Northern Dynasty touts the Pebble deposit as "the world's largest undeveloped copper and gold **resource**,"[9] another firm (with a far lower valuation), Seabridge Gold, says that *it* owns "the world's largest undeveloped gold/copper project **(by reserves)**" (emphasis added).[10] The distinction may seem minor, but it's not. As Northern Dynasty itself discloses, "there are currently no known reserves or body of commercially viable ore [in the Pebble deposit] and the Pebble Project must be considered an exploration prospect only.…Mineralized material which is not mineral reserves does not have demonstrated economic viability."[11] In short, Northern Dynasty itself is unsure whether the deposit is worth mining.

While bullish investors may dismiss such disclaimers as boilerplate legalese, the history of the Pebble project strongly suggests otherwise. Over the years, the project has attracted several large mining players, yet all of them ultimately walked away. First, Teck, which discovered the deposit in the first place, gave up on it, as one author described:[12]

In the late 1990s, several years after Phil St. George first staked out a mining claim for Cominco Alaska Exploration, the company, renamed Teck Cominco, spent $8 million to drill exploratory core samples around the Pebble mine site, to get a sense of what lay beneath the tundra. The company estimated the minerals there were worth about $10 billion. Teck Cominco continued to sink boreholes into the site until 2001, when, for

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[8] In May 2014, Switzer also wrote, "I was managing environmental affairs at Cominco (now Teck) when I discovered Cominco owned Pebble. I was informed, upon inquiry, that Pebble was at best marginally economic because of low grade and other factors, and physically challenging because of water management. A no-go, so forget about it."

[9] See e.g. January 2017 corporate presentation, slide 5.

[10] Seabridge Gold February 2017 corporate presentation, slide 10.

[11] Northern Dynasty 2015 Form 20-F, p. 15.

[12] Alex Prud'homme, *The Ripple Effect: The Fate of Freshwater in the Twenty-First Century* (2012), p.

reasons that have never been made public, the company, which has years of experience mining in the difficult conditions of Alaska, decided to sell off its Pebble holdings.

As already mentioned above, Teck sold its holdings to Northern Dynasty for $14 million plus a 4-5% share of any future mining profits. Northern Dynasty paid in shares, but rather than retain any additional exposure to Pebble, Teck liquidated the shares as soon as it could. Furthermore, under the terms of its agreement with Northern Dynasty, Teck could have taken a 50% retained interest in a portion of the project rather than accepting cash; instead, it chose the cash. If Pebble were really the bonanza that Northern Dynasty claims it is, why would Teck – a company with extensive North American mining experience – put such little value on it?

Similarly, Mitsubishi became a major Northern Dynasty shareholder starting in 2007, but in February 2011, it sold its entire stake – "indicating to many," in the words of one contemporaneous report, "a collapse of institutional confidence in Pebble." Moreover, the sale took place long before the project's severe regulatory problems became obvious.

The large mining company Rio Tinto was also a major Northern Dynasty shareholder, beginning in 2006, but it complained publicly in 2012 that it had "no interest" in Northern Dynasty's tentative plan for an open-pit mine at Pebble[13] and, in December 2013, announced that it would "undertake a strategic review, including a possible divestment, of its shareholding in Northern Dynasty." In April 2014, it simply *gave its shares away* to two Alaskan charitable foundations focused on the Bristol Bay region. Though Rio Tinto's initial announcement came after the EPA had released the first draft of its watershed assessment, it came *before* the final draft and *before* the EPA actually initiated Section 404(c) veto proceedings. With the regulatory process still, at that time, so uncertain, and with many options for legal action open to Northern Dynasty in the event of an adverse decision – in addition to the option of just waiting for a more laissez-faire EPA administrator to step in – why would Rio Tinto choose to walk away? Why not hang on? We believe the only rational inference is that Rio Tinto came to doubt the *profitability* of any future Pebble mine. With no real economic upside to moving ahead with the project, it decided that it might as well claim the small public-relations victory of donating fundamentally worthless shares to charity. (In at least one case, the charity itself chose to get rid of its shares as soon as possible.)

In fact, *Northern Dynasty itself* tried to sell its stake in Pebble in 2011 – but failed. The Alaska *Journal of Commerce* wrote:

> Since the Feb. 23 release of a preliminary assessment of Pebble's value conducted for Northern Dynasty that ruffled feathers with partner Anglo American Plc of London, the Vancouver-based junior mining company has been on an aggressive sales push touting the prospect.

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[13] Source: Bloomberg, "Rio Tinto CEO Says Open-Pit Mine Would Be Wrong Plan for Pebble," April 19, 2012.

Anglo American had griped publicly about Northern Dynasty's release of a report it had commissioned that argued that the Pebble project was worth roughly $4 billion after tax (not the ludicrous hundreds of billions that some bulls now suggest). Anglo said, "It is too soon to draw any firm conclusions regarding either the final design or the economics of Pebble…This disclosure is premature."[14] Evidently, Northern Dynasty was eager to cash out on the basis of its "premature" assessment rather than wait around to see what value the mine actually generated.

But, as the Associated Press reported later, Northern Dynasty failed to drum up any bidders (emphasis added):

> A mining company with a 50 percent interest in a huge copper and gold deposit where hundreds of millions of dollars have been spent on exploration is trying to find a buyer for the contentious project.…Northern Dynasty circulated the information in February and March that it was interested in a buyer for Pebble. **So far, it has received no offers.**

Teck sold, Mitsubishi sold, Northern Dynasty tried to sell, and Rio Tinto announced its intention to sell *all well before* the EPA initiated its veto process. The only explanation that makes sense, as other observers including the mining consultant quoted above have argued, is that the more these entities learned about Pebble, the more they doubted its commercial viability.

## *Anglo American Personnel Believed the Pebble Project Had Negative NPV*

Of all the actual and attempted Pebble exits, Anglo American's in 2013 is the most revealing case, because Anglo was intimately involved in planning for the project – not as an outside minority investor, like Mitsubishi and Rio Tinto, but as an equal partner alongside Northern Dynasty. Anglo's official statement, though couched in vague and euphemistic language, made it clear that the decision was based on economics:

> Despite our belief that Pebble is a deposit of rare magnitude and quality, we have taken the decision to withdraw following a thorough assessment of Anglo American's extensive pipeline of long-dated project options. Our focus has been to prioritise capital to projects with the highest value and lowest risks within our portfolio, and reduce the capital required to sustain such projects during the pre-approval phases of development as part of a more effective, value-driven capital allocation model.

Phrased more bluntly, Anglo acknowledged that there was indeed a lot of copper and gold in the Pebble deposit ("rare magnitude and quality") but concluded that its *economic value* was nonetheless low, and its risks dauntingly high, in large part because the upfront capital costs would be enormous. If Anglo saw any real value in the project but simply wanted to shoulder

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[14] Source: Bloomberg, "Anglo Says Too Soon to Evaluate Pebble Mine; Partner Premature," February 25, 2011.

less of the funding burden, it could have attempted to renegotiate the agreement or even bought out Northern Dynasty entirely to take full control of the pace of spending. But it didn't even try to negotiate;[15] it just withdrew.

While Northern Dynasty attempted to spin Anglo's exit as a signal about Anglo's troubles, not Pebble's, it explicitly shot down the notion that regulatory concerns drove the decision. In response to one worried investor who asked if the company found the timing of Anglo's exit "curious" in light of a recent EPA visit, management responded, "I don't think the EPA's visit to the site had anything to do with it," noting that the visit was "seen by everybody as pretty positive."[16] The notion that Anglo withdrew because of the EPA's veto – which hadn't even been set into motion yet – is baseless revisionist history. As one former Anglo engineer told us, "Anglo exited because of economics."

Notwithstanding Northern Dynasty's protests, investors clearly took Anglo's exit as a shockingly negative message about Pebble; the project's implied value fell by ~70% over the days following the announcement.[17] To better understand Anglo's decisions, we spoke with multiple engineers and others directly involved in planning the Pebble project. What they told us confirmed what reasonable investors had already concluded back in 2013: key Anglo personnel came to view Pebble as fundamentally flawed and unworkable, with capital and operating costs far in excess of what Northern Dynasty hoped for. In fact, engineers working on the project kept finding, after considering a wide range of possible mine designs over a period of years, that Pebble's net present value was **negative,** to the tune of multiple billions of dollars – all while assuming long-term metal prices that *exceed* prices today. Of course, using lower prices would generate an even more negative NPV, making investing in Pebble look like an even worse idea.

Strikingly, two sources told us that, while Anglo's final analysis of the project was effectively complete by 2013, Northern Dynasty insisted that it be terminated prematurely and *not* officially presented to the Pebble Partnership's highest-ranking leaders. Why? Based on our discussions, Anglo personnel believed that Northern Dynasty wanted to avoid disclosure requirements under Canadian securities law. In other words, according to people directly involved in the Pebble project, Northern Dynasty knew that the Anglo analysis had found that Pebble was worse than worthless but did everything it could to keep that information out of shareholders' hands.

How could it be that such a large mineral deposit isn't worth mining? The answer is as simple as the analysis was complex: cost. As one person involved with Pebble put it,

> That thing is *big.* It's a massive area. Everything on Pebble was done on a grand scale. I've never seen a mine like that….The Pebble project was pushing the boundaries of engineering.

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[15] Source: Northern Dynasty's September 2013 conference call.
[16] A recording of the conference call is available from Northern Dynasty.
[17] Northern Dynasty's share price fell 40% from September 13, 2013, to September 23, 2013, before temporarily stabilizing, but over that period it effectively went from owning just half of Pebble to all of Pebble. Thus the implied drop in Pebble's value was not 40% but 70%.

Such an enormous operation in such a remote area called for proportionately large-scale *de novo* infrastructure, including a brand-new port, a massive power plant, an 86-mile-long road, a large water-treatment facility, and enormous dams to contain the mining waste known as tailings. Based on our discussions, we believe that the relationship between Northern Dynasty and Anglo American became tense as Northern Dynasty representatives repeatedly pressured Anglo American and third-party engineers to slash their estimates of how high these infrastructure costs would run. According to three sources, when Anglo representatives concluded that the capacity of the hypothetical mine's power plant would need to be hundreds of megawatts higher than Northern Dynasty had assumed, at an incremental cost of hundreds of millions of dollars, Northern Dynasty reacted badly. In the words of one engineer:

> Obviously HDI Mining [*i.e. Hunter Dickinson Inc., Northern Dynasty's management company*] didn't like those figures, and they started taking the team to task about it.…They were trying to sell a positive story, while Anglo erred rather toward a conservative side of things. … It's lots of challenge. You have to bring your own power. You've got to bring your own food, your own buildings. You've got to bring everything yourself – and then, to think 240 megawatts would do it?…I've got tangible figures, and I would like people to come and argue with me, because maybe there's something that I didn't know. And they [*Northern Dynasty*] just came in there with, in my view, a hidden agenda of telling a good story.…Some people always want to tell a good story to get their bonuses.

Another source agreed that Northern Dynasty lowballed the realistic power requirements of the project, recalling that, whenever the company saw backup power in a mine design, "they would cut that down to a minimum to begin with – and then some."

In another dispute, we were told, Northern Dynasty pushed a plant design that included a single very large conveyer moving at unusually high speed to transport raw material, failing to properly allow for the likelihood that the conveyer would break down and require difficult, time-consuming repairs, reducing the plant's throughput. But Northern Dynasty shot down the more practical concept of using two smaller conveyers – motivated entirely, in the view of one engineer, by a desire to make the business case look better by reducing capital costs. "Cost was everything," this engineer told us. "HDI Mining was blowing down the project team members' neck to reduce costs, reduce costs.…They always tried to cut back on capital."

The disagreements didn't stop there. Anglo personnel believed that Northern Dynasty failed to understand just how difficult and costly mine logistics would be. For instance, the site was to be supplied with large numbers of shipping containers, many of them containing huge quantities of explosives to blast apart rock. Where would all these containers go? Were large enough amounts of explosives easily available? Could a large-scale port facility really operate with only a handful of staff members? Could the mine really get by with a cheap, unpaved road? Could it attract and retain enough skilled workers if it provided no recreational opportunities and offered living quarters that one Pebble project participant described to us as "like the Russian army –

just bare necessity"? Anglo personnel also believed that Northern Dynasty's analysis underestimated the high costs of standard environmental mitigation measures like waste-water treatment – all in a bid to flatter the spreadsheet economics of the project rather than develop an accurate picture of what the mine would realistically cost.

Overall, the work of Anglo and third-party engineers indicated that the likely upfront capital cost of the Pebble project would be roughly $11 to $13 billion – more than double the $4.7 billion figure used in the Northern Dynasty–commissioned 2011 preliminary assessment. While Northern Dynasty's estimated operating costs were, in Anglo's view, more realistic, they were still roughly 20% too low. Despite years of effort, engineers not directly affiliated with Northern Dynasty just couldn't find a reasonable scenario where building the Pebble mine yielded a positive net present value – even using standard hurdle rates that did not account for the unusually severe regulatory risk that the project has long suffered from, and even using assumed metal prices higher than those that prevail today. Thus, when Anglo upper management began to pare back its worst projects, Pebble was an easy target.

The notion that Pebble couldn't generate an adequate return on investment in any realistic scenario is the only thing that makes sense of Anglo's radical actions: walking away from almost $600 million of sunk costs without making any effort to restructure its deal with Northern Dynasty, well before the EPA initiated its veto.

Consider again the history of Pebble. Teck, Mitsubishi, Rio Tinto, Anglo American: all walked away from it. Northern Dynasty itself tried to divest its then 50% stake but found no interested buyers. Based on our discussions with people personally familiar with the project, Northern Dynasty knew that Anglo engineers had determined that Pebble had negative NPV and thus wasn't worth mining – but, rather than counter this analysis, Northern Dynasty apparently attempted to bury it.

Does this sound like an asset that's worth $1.1 billion? No. It sounds like an asset that's worth nothing.

## IV. The Pebble Project Continues to Face Immense Political Risks

### *Alaska Doesn't Want the Pebble Mine*

> *I can't imagine a worse location for a mine of this type, unless it was in my kitchen.*
> —former Governor Jay Hammond (R-Alaska)
>
> *I am not opposed to mining, but it is the wrong mine for the wrong place.*
> —former Senator Ted Stevens (R-Alaska) discussing the proposed Pebble Mine at a campaign stop in 2008

*Wrong mine, wrong place, too big. Too many potential long-term impacts to a fishery that is pretty critical to that area but also to Alaska, to world markets.*
—former Senator Mark Begich (D-Alaska), 2014

*Based on what I know at this point I'm not in favor of Pebble.*
—current Alaska Governor Bill Walker (independent but former Republican), 2014

*Pebble has had all the reviews it needs and the people have spoken. Go away and take Pebble with you.* [from user Ninety-Nine Under A Buck]

[The EPA veto] *actually was fair... you just cried about it. Alaskans don't support Pebble Mine!* [from user Eric Ryan]

*We all understand that you want to cash in on your project, however the livelihood of thousands of people and our nature is at stake.* [from user Alaska1989]

*Alaskans have been saying NO! to the Pebble Mine project for about a decade now. No means no. Cut your losses and leave. Pebble's persistence isn't winning new friends in Alaska.* [from user Jerry W.]
—select comments posted in response to a pro-Pebble opinion piece written by the Pebble Limited Partnership's CEO, 2017

Northern Dynasty bulls enthralled with the Trump narrative often depict Pebble as the victim of an unfair, interventionist Obama administration that imposed its environmentalist agenda on the development-friendly state of Alaska. The reality is quite different. While some Alaskans did resent what they perceived as high-handed action on the part of the EPA, many of those same people – and many others besides – *still oppose the development of the Pebble deposit;* they just believe it's up to Alaska, not the federal government, to stop it. Because it not only threatens a pristine ecosystem but also jeopardizes Native lifestyles, large-scale commercial fishing, and tourism, Pebble has brought together many strange bedfellows: for instance, both the jewelry retailer Tiffany & Co. and the gun manufacturer Sturm, Ruger & Co. have spoken out against it. While national environmentalist groups may indeed hold little sway under the Trump administration, Alaskan voices still matter in Alaska.

Brian Kraft, the owner of several Alaskan fishing lodges, ably summarized the consensus in a January 24th opinion piece entitled "Pebble Is Still the Wrong Mine in the Wrong Place":

> Backers of the Pebble mine seem to think that the recent election grants them a green light to proceed with a mine that risks American jobs and Alaska's economy. Reality says otherwise: Opposition to the Pebble mine has never been greater or more widespread. Alaskans and hundreds of thousands of others across the country are united in the fact

> that the Pebble mine is too risky because it trades lasting American jobs for temporary ones backed by a foreign mining conglomerate.…
>
> Opposition to the proposed Pebble mine is driven by Alaskans; not outside interests. Alaska business owners, tribes, sportsmen and women, and commercial fishermen are standing up for their way of life and a uniquely Alaskan and treasured resource. Our opposition won't wane with changes in the political tides.
>
> Pebble has a reputation of breaking promises. For more than a decade, we've heard a foreign mining company with zero experience in actually developing a mine make false and unfulfilled promises. … So no, these are not good neighbors, and they do not have Alaskans' best interest at heart. Any new promises should fall on deaf ears, both in Alaska and in Washington, D.C. After 10 years of listening and learning about the Pebble mine, a majority of Alaskans in a typically mining-friendly state continue to come to the same conclusion: The Pebble mine is too risky to our jobs and way of life and we will do whatever we can to stop it.

This is not just cheap talk. In recent years, two ballot initiatives have clearly expressed Alaskans' opposition to the project. First, in 2011, voters in Alaska's Lake and Peninsula Borough, which encompasses Pebble, approved by a 6.5-point margin a measure that would have denied mining permits to any project that "will have a significant adverse impact on existing anadromous (salmon) waters." Though this "Save Our Salmon" initiative was later ruled to unconstitutionally preempt state authority, it directly signaled the unpopularity of Pebble among the very people it often purported to benefit. Then, in 2014, voters across Alaska approved by a landslide 66% to 34% margin a measure that requires the state legislature to explicitly approve mines like Pebble (rather than allow regulatory agencies to decide):

> In addition to permits and authorizations otherwise required by law, a final authorization must be obtained from the legislature for a large-scale metallic sulfide mining operation located within the watershed of the Bristol Bay Fisheries Reserve…This authorization shall take the form of a duly enacted law finding that the proposed large-scale metallic sulfide mining operation will not constitute danger to the fishery within the Bristol Bay Fisheries Reserve.

If the legislature cannot agree that the mine poses no "danger to the fishery," the mine won't be allowed, no matter what other federal, state, and local permits it has obtained. Notably, as the fishing-lodge owner Brian Kraft has pointed out, "a majority of Alaskans in every voting district in the state – regardless of partisan preference – voted for additional protections for Bristol Bay." As demonstrated by the opposition of many high-profile Republican politicians, anti-Pebble sentiment cuts across conventional party lines. The mine's local unpopularity, coupled with the added requirement of legislative approval, would put its future in grave danger even if it *were* commercially viable. Alaskan voters have ensured that the project can't quietly wend its way toward approval; in the end, it will have to win over the public, not just behind-the-scenes bureaucrats. Northern Dynasty, however, has had more than a decade to win over the public, and it has definitively failed; there's no reason to believe it will suddenly start succeeding. Even if the EPA allows Pebble to proceed, we believe the Alaskan legislature will block it.

In addition, local politicians and activists continue to impede the project in smaller ways. At the end of last year, what would normally be a rubber-stamp exercise became another opportunity to fight Pebble, as the Alaska *Dispatch News* described:

> Following a flood of comments and a report addressing pollution concerns at the proposed Pebble mine, Alaska resource managers have temporarily delayed a decision over whether to approve a new land-use permit for the project and instead extended Pebble's old permits.
>
> Pebble critics hope the delay means the Alaska Department of Natural Resources will use the extra time to implement stricter cleanup guidelines before the 2017-2018 hard-rock exploration and reclamation permit is approved.…The additional three months will give state reviewers time to properly analyze more than 1,000 comments associated with Pebble's request for the new permits…

While the delay likely won't inflict any long-term damage, it demonstrates the continued strength of the anti-Pebble coalition. Likewise, the state legislature is currently considering yet another measure to make it more difficult for Pebble to be developed, as the AP reported on January 31st:

> Democratic Rep. Andy Josephson wants to build off [the 2014 ballot initiative] by requiring that the commissioners of Natural Resources, Environmental Conservation and Fish and Game must each determine that mine backers have proven beyond a reasonable doubt that their operations won't be a danger to the fishery, fish or wildlife in the region.

Meanwhile, the Alaska Board of Fisheries has proposed that the legislature create a clearer definition of "the proper protection of fish and game" in order to give the board stronger authority to block potentially damaging developments – a measure squarely aimed at hampering "mega projects" like Pebble by solidifying another layer of veto power.

All of this Alaskan resistance to the Pebble project – often characterized as an unwanted intrusion from an untrustworthy foreign entity – changes the political calculus for the Trump administration. What would it gain by tipping the scales in favor of Northern Dynasty? Indeed, the anti-Pebble cause, supported by 66% of voters, is far more popular in Alaska than Trump himself, who won only 51%. Withdrawing the EPA's preemptive veto as a symbolic gesture toward executive restraint might appeal to some in Washington, but the administration has nothing to gain from pushing the project any harder than that. The safest course is to leave the final decision up to the people of Alaska – who don't want the Pebble mine and now have the power to stop it.

## *The Threat of an EPA Veto Will Never Go Away*

Even at the federal level, however, the Pebble project isn't safe. If we give Northern Dynasty the benefit of the doubt and assume that the Trump/Pruitt EPA will indeed withdraw its veto, the fact remains that the Clean Water Act empowers the head of the agency to effectively shut down a mine "**whenever** he determines, after notice and opportunity for public hearings, that the discharge of [mining waste]…will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishery areas (including spawning and breeding areas), wildlife, or recreational areas" (emphasis added). The word "whenever" is crucial because it enables future EPA administrators to undo their predecessors' decisions. If Pebble is allowed to enter the lengthy permitting process – which, in this case, is certain to be contentious and closely scrutinized – it's perfectly possible that, before it's finished, the EPA will be back under Democratic control. Given the influence of environmentalist interests on the Democratic Party, the unique unpopularity of the Pebble project, and the Obama EPA's clearly articulated reasoning for expecting "unacceptable adverse effect[s]" from the mine, we believe that any future Democratic EPA would swiftly re-impose the veto.

In fact, even if the Pebble project moves beyond permitting and actually enters development and production – an outcome we regard as vanishingly unlikely because of the project's negative NPV and consequent inability to attract long-term funding – the EPA can *still* shut it down using the same Section 404(c) authority. A recently decided appellate court case, *Mingo Logan Coal Co.* v. *EPA*, confirms this interpretation of the law. In that case, Mingo Logan Coal Co. received a permit to discharge mining waste in 2007. It began to make use of that permit to mine for coal, but just two years later, after the executive branch had switched from Republican to Democratic control, the EPA effectively negated the permit, declaring that the mine was too harmful to downstream water quality. Mingo Logan objected that this retroactive veto overstepped the bounds of the EPA's power, but it lost.

For any potential partner with the resources to build the Pebble mine, this precedent is terrifying. While regulatory risk plagues any mining operation, Pebble is *sui generis:* a gargantuan open-pit mine right on top of an environmentally, politically, and economically sensitive pristine watershed that EPA staff *already concluded* was too destructive and dangerous to allow. (Consider, for instance, that the EPA estimated that Pebble could destroy up to 94 miles of streams; by contrast, it thought Mingo Logan's Spruce No. 1 Mine would destroy just 7 miles of streams – and *still* judged that impact damaging enough to veto.) Anyone considering building the Pebble mine would have to commit to it for decades and sink many billions of dollars into it before receiving a single penny of profit. Yet the slightest shift in the political winds at any point in the future could instantly render that multi-billion-dollar investment utterly worthless. The fact that one administration might grant the project a (reversible) reprieve today is little comfort to an operator considering capital allocation over the next half century. For a project with enough upside at a low enough price, this staggering political risk might be worth taking; for Pebble, which several of the world's largest mining companies have already abandoned, it obviously isn't.

## V. Conclusion

Northern Dynasty has skillfully exploited the Trump narrative to reignite enthusiasm for a company that the market had left for dead. But "telling a good story" is all Northern Dynasty has ever been good at. It's not just some stroke of bad luck that everyone who has touched the Pebble deposit, from Teck to Mitsubishi to Rio Tinto to Anglo American to Northern Dynasty itself, has given up on it or tried to; the project is fundamentally and irretrievably flawed, requiring far too much expensive infrastructure to generate an adequate return on investment mining low-grade ore. Our discussions with technical experts directly involved in the project indicated that Northern Dynasty itself has long been aware of these fatal flaws but opted to paper them over rather than fess up. Nonetheless, Northern Dynasty can't keep the charade going forever; without a deep-pocketed partner, it will ultimately perish.

The company's ongoing political challenges only make matters worse. The withdrawal of the EPA's veto, if it even occurs, will do little to safeguard Pebble. Alaskans clearly don't want it, and they have the power to stop it even if mining-friendly regulators eventually, in five to seven years, give their blessing. Moreover, at the federal level, Democrats clearly don't want it, and they too will have the power to stop it by re-initiating the veto process the next time they take the White House. With so many ways to lose, the Pebble project is doomed: politically impaired and commercially futile. Northern Dynasty's shares are worthless.

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