



COMMONWEALTH OF PENNSYLVANIA  
PUBLIC SCHOOL EMPLOYEES' RETIREMENT SYSTEM

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Public Investment Memorandum

**Denham Mining Fund, L.P.**

Commodities Commitment

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**Raymond J. Schleinkofer, CFA**  
Senior Portfolio Manager

**Michael Tyler**  
Portfolio Manager

**November 7, 2017**



### **Recommendation:**

Staff, together with Hamilton Lane, LLC, recommends to the Board a commitment of up to \$150 million to Denham Mining Fund, L.P. (the "Fund"). Denham Capital Management, LP has organized the Fund to exploit a perceived dislocation in the mining sector created by the overhang from the commodity super cycle of the early 2000s.

### **Firm Overview:**

Denham Capital Management, LP ("Denham", the "Firm", or the "Investment Manager") is a global private equity manager specializing in natural resources (metals and mining, oil, natural gas and down-stream power generating facilities). The founding members of Denham began investing together at Harvard Management Company, Inc. (HMC) in May of 2000. In 2004, the Denham team left HMC to participate in the founding of Sowood Capital and ultimately separated to form Denham in June of 2007. Since that time Denham has deployed \$889 million across six funds. The firm is led by: Stuart Porter (CEO), Carl Tricoli (Co-President), Scott Mackin (Co-President), Riaz Siddiqi (Partner) and Jordan Mayer (Partner). Denham currently has 80 employees with offices in Boston, Houston, London, Sao Paulo and Perth. The firm is a registered investment advisor with the Securities and Exchange Commission.

Denham's first six funds offered a multi-sector approach investing opportunistically across each of its disciplines: metals and mining, oil and natural gas, and power generation. In 2016, the firm restructured its teams to offer separate funds in each of its three disciplines: energy, mining and power generation. The separation was designed to improve alignment of team members and allow investors to adjust their allocations to each sub-sector. In 2016 Denham raised \$900 million for its first stand-alone Oil and Gas fund. Denham mining is targeting commitments of \$750 million. Stuart Porter, Carl Tricoli, Robert Still and Bert Koth are the partners of the Mining Fund GP. The fund will invest globally and targets opportunities in base metals (ex: copper, zinc), bulks (coal and iron ore), industrial metals (rare earths) and precious metals.

### **Market Opportunity:**

Denham believes that the aftermath of the commodity "super cycle" has created a dislocation in funding for junior miners (mining projects that have not entered production and will ultimately rely on the capital markets for additional funding). Denham cites emerging market demand as a key driver of commodity prices, capital investment and ultimately stranded capital in the mining sector. For example, as Chinese urbanization expanded, the country's demand for iron ore grew to exceed 57% of global supply. Expanding prices lured mining companies to boost capital expenditures from \$13 billion in 1990 to \$275 billion in 2011.<sup>1</sup> The equity markets opened for junior miners who raised capital on the assumption that they could go back to the market as projects required additional funding. When the Chinese economy slowed and commodity prices declined, the capital markets closed for many of these companies whose share prices had fallen dramatically. According to PWC, in 2015 the top 40 mining companies experienced a 37% decline in market capitalization, erasing all gains made during the super cycle. These companies took \$53 billion in asset impairment charges that year, equivalent to 75% of the total capital they deployed.<sup>2</sup> Miners across the market capitalization spectrum have been selling assets to defend their balance sheets but the paucity of capital has been particularly challenging for junior miners. Denham's strategy is to acquire pre-production assets, improve operations, bring them into production and then exit into the still robust merger and acquisition market that exists for producing assets.

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<sup>1</sup> Denham PPM and SNL Financial

<sup>2</sup> PWC mining 2016



## Euromoney Global Mining Index



Source: Bloomberg

### **Portfolio Fit:**

A commitment to the Fund will be allocated to PSERS' Commodity portfolio. In order to achieve effective protection from inflationary environments the PSERS' asset allocation targets an 8% allocation to commodities. While commodities provide strong inflation hedging attributes, they also have a relatively low Sharpe ratio (0.14 vs. 0.35 for equities and 0.55 for global bonds).<sup>3</sup> An allocation to private mining is designed to retain the inflation hedging elements of commodities (as prices rise, more costly parts of a mine may become economically viable for extraction) in addition to the basic private equity value proposition (skilled managers improving business economics and selling as cash flow grows). The strategy does require some sacrifice of liquidity; however, this opportunistic allocation remains modest vs. the overall PSERS commodities position of over \$4.2 billion, the vast majority of which currently offers daily liquidity. We estimate that the base metals and bulk commodities that Denham targets comprise approximately 17% of the overall Bloomberg Commodity Index, implying a look-through allocation of \$714 million to this market segment.

### **Investment Strategy:**

Denham seeks to acquire control positions in assets that have already seen significant capital investment by the prior owners. Denham partners with local operating management teams to improve operations and bring assets into production. The approach allows Denham to leverage deep expertise in esoteric minerals and geographies to accelerate the path toward production.

The manager seeks assets that display the following characteristics:

- A Position Low on the Cost Curve
- Long Lived Reserve Bases
- Parcels with Upside Potential
- Commodities displaying Favorable Supply and Demand Dynamics

Denham proactively sources assets and management teams that fall into targeted investment themes. The approach was designed to mitigate against style drift and control risks. Key themes for the mining fund include:

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<sup>3</sup> Bridgewater Associates presentation to PSERS board September 14, 2017.



- Assets with a Fast-Track to Cash Flow
- Insert Management to De-Risk and Develop Existing Mines
- Engage In High Impact Exploration

Denham expects that the majority of the Mining Fund transactions will fall into the first category which it views as subject to less operational risk than the other, potentially higher returning themes.

**Investment Instruments:**

Given the potential for attenuated investment cycles, operational delays and vicissitudes of commodity prices, Denham relies primarily on equity to finance its investments. Modest project-level debt is anticipated with minimal fund level leverage. The fund may extend interim financing to portfolio companies in exceptional circumstances. The fund does not anticipate hedging commodity prices or currency. While portfolio companies may hedge current production, it is unlikely that non-producing assets will be hedged. The fund's base currency is the US dollar.

**Investment Team:**

Stuart Porter, Carl Tricoli, Robert Still and Bert Koth are the partners of the Mining Fund GP and comprise the investment committee. All investments must be unanimously approved by the committee. The Mining Fund is structured to provide the vast majority of the economics to the Mining Fund investment professionals with a minor portion reverting to Denham Capital Management, allowing the Fund to leverage the infrastructure and back office support of the entire 80-person organization. Key individuals and their backgrounds are listed in the table below.

Name	Role	Investment Team	Yrs. Experience Denham / Total	Prior Experience
Stuart Porter	Denham Capital, Founder & CIO	Yes	10 / 29	Founder Sowood Capital, VP Portfolio Manager Harvard Management Company
Carl Tricoli	Co-President and Global Head of Natural Resources.	Yes	10 / 36	President, GeosCapital Vice President, Enron North America Managing Director, Koch Producer Services
Robert Still	Partner	Yes	6/ 38	Chairman Pangea Exploration Rhovon, Ticor
Dr. Bert Koth	Managing Director and Partner	Yes	9 / 21	Manager, BHP Billiton Vice President Metals and Mining Corporate Finance, Deutsche Bank
Victor Munoz	Managing Director	Yes	10/18	Director PSER Global Manager Enron Associate Chase Securities
Caroline,Donally	Managing Director	Yes	6/21	Resource Finance, Rand Merchant Bank Mining & Resources Finance, Investec Bank Manager, BDO Spencer Steward
Mark Riccio	Director	Yes	4/14	Vice President Natural Resources Investment Banking, Merrill Lynch International

**Investment Highlights:**

<b>Uniquely Positioned Management Team Leveraging Global Mining Talent</b>
Denham's strategy is tailored to leverage the team's vast array of industry knowledge and local contacts. By targeting mid-market mining companies, Denham has the ability to take control of stranded assets and select best in class management teams to improve operations, unlocking the value created when stagnate assets enter production.



<p><b>Market Dislocation Offers Compelling Value Opportunity</b></p> <p>The overhang from the great commodities “super cycle” provides fertile ground for Denham to source mines that are closer to production. With over \$58 billion in projects that have been started by junior minors and few dedicated mining private equity funds, Denham has the opportunity to extract value in shorter time frames, with far less operational risk than traditional exploration-and-development focused funds.</p>
<p><b>Attractive Way To Hedge Inflation Risks</b></p> <p>Liquid commodities offer low long-run expected returns (typically in line with inflation) while incurring substantial volatility. The most common method for gaining exposure is through futures contracts, introducing the potential that roll yield (the difference between the futures price and expected spot price) can overwhelm the actual commodity return. By contrast Denham targets returns in line with other private equity strategies and offers the inflation hedging aspects of owning physical commodities (i.e. metals in the ground).</p>

**Investment / Risk Considerations:**

<p><b>Regulatory, Sovereign And Environmental Risk</b></p> <p>Global mining requires nuanced ability to navigate local political, regulatory and social issues. While Denham has adopted a thoughtful ESG policy, these risks cannot be completely eliminated. Denham’s approach of backing local management teams with specific knowledge of each project’s unique challenges helps to mitigate these issues. Most of Denham’s projects have been substantially developed by prior owners, in many cases the most salient risk factors have already been uncovered by the time Denham arrives. Denham targets projects that can be accessed with conventional, time-tested extraction methods, reducing the likelihood of unexpected regulatory or environmental concerns.</p>
<p><b>Potential For Attenuated Holding Periods</b></p> <p>While Denham has focused its approach on shortening the time to production, execution risk exists. Geophysical challenges can extend holding periods and occasionally even require funds to extend their duration beyond the stated life. Initial result from Denham’s mining projects have been promising and the Denham team’s long history in the sector ensures that each transaction will be entered with a healthy understanding of the potential challenges.</p>
<p><b>New Organizational Structure</b></p> <p>Although the Denham Mining team has worked together in a series of prior funds, this is the first time that Denham has offered its asset classes as stand-alone funds. The structure is logical and more directly ties partners to the fate of their specific projects, nevertheless it is a new operating dynamic.</p>
<p><b>Currency and Commodity Prices</b></p> <p>Mining projects by definition are subject to mercurial commodity prices and Denham’s global approach may involve exposure to currencies that are expensive or impossible to hedge. Most operating costs are local providing a degree of protection against currency movements and even commodity prices. While it is generally not pragmatic to hedge non-producing assets, this exposure does provide protection against inflationary environments.</p>

**PSERS History & Performance:**

In December of 2011 PSERS committed \$75 million to Denham Commodity Partners Fund VI, L.P. the manager’s final multi-asset class fund. In 2013 PSERS committed another \$25 million to an oil and gas co-investment vehicle, the DCPF VI Oil and Gas Co-Investment Fund, L.P. Results have been encouraging. To date Fund VI has already shown an MoC of 1.2x and 9.6% IRR (as of 6/30/2017).

Investment	Vintage Year	Commitment	Funding	Distributions	Valuation	IRR	TVPI
Denham Commodity Partners Fund VI, L.P.	2011	75.0	68.0	26.5	54.6	9.56	1.19
DCPF VI Oil and Gas Co-Investment Fund, L.P.	2013	25.0	21.5	4.6	30.4	32.23	1.63
<b>Total</b>		<b>100.0</b>	<b>89.5</b>	<b>31.1</b>	<b>85.0</b>	<b>14.44</b>	<b>1.30</b>



**Investment Committee Disclosure:**

<b>Relationship with Hamilton Lane:</b>	None
<b>Introduction Source:</b>	Fund Sponsor
<b>Placement Agent:</b>	Not used
<b>PA Political Contributions:</b>	None Disclosed
<b>PA Presence:</b>	1 energy exploration investment, 1 PA location, 39 employees, Market Value \$109.3 million; PSERS NAV \$3.7 million.
<b>Potential Conflicts:</b>	None Disclosed
<b>First Time Fund With PSERS:</b>	No
<b>PSERS AIC Approval:</b>	November 7, 2017

**Oversight Responsibility:**

<b>Investment Office:</b>	Charles J. Spiller Deputy CIO, Non-Traditional Investments Tom Bauer Deputy CIO, Traditional Investments Ray Schleinkofer Senior Portfolio Manager Michael Tyler Portfolio Manager
<b>External Consultant:</b>	Hamilton Lane



# Hamilton Lane

October 30, 2017

Board of Trustees  
Commonwealth of Pennsylvania  
Public School Employees' Retirement System  
5 North 5<sup>th</sup> Street  
Harrisburg, PA 17101

Re: Denham Mining Fund LP

Dear Trustees:

Denham Capital Management LP (“Denham”) was founded in 2007 to focus on private equity investments in energy and commodities. Denham has raised and managed six funds to invest in oil and gas, mining and international power; however, in 2015 the General Partner began raising separate funds dedicated to each sector. Denham constructed the investment team with professionals who have extensive industry experience and are primarily focused on mining investments in the multisector funds. The senior mining team is well-tenured, averaging 27 years of total experience and eight years of tenure at Denham; the investment professionals’ experience of investing together through the multisector funds has enabled them to establish a cohesive culture. The General Partner has nine investment professionals dedicated to the mining strategy, which is expected to benefit from the support of the broader Denham platform of approximately 62 employees. The investment team is also supported by a technical committee, which helps source investments, provide initial assessments of potential mining projects and obtain portfolio company board seats to assist with the value creation process. Denham is targeting \$750 million in commitments from limited partners for its first dedicated mining fund, Denham Mining Fund LP (the “Fund”). Denham held a first close of \$200 million in April 2017 and expects to hold a final close in March 2018. The General Partner will commit at least 2% of commitments to invest in or alongside the Fund.

The Fund will primarily focus on metals that display attractive supply and demand fundamentals and have an increased probability of price recovery; the General Partner seeks to invest (i) 60% of the Fund in base metals, which includes copper, zinc, cobalt and nickel, (ii) between 15% to 20% in metallurgical coal and (iii) 20% to 25% in specialty industrial metals. Consistent with investments in prior funds, Denham will target investments in Australia, Asia, Latin America, Africa and North America. The General Partner employs a thematic investment approach, focusing on pre-production assets that are expected to generate meaningful near-term cash flow. Denham seeks to partner with experienced, local management teams that have developed extensive networks in targeted regions, leading to direct sourcing opportunities. Local management teams help the investment team source, identify and diligence potential assets prior to acquisition; the management team’s deep industry networks and expertise is expected to generate direct deal flow for the Fund. The General Partner has identified six management teams across Australia, Canada, Chile, Peru and South Africa and seeks to partner with them on a repeat basis. The Fund will primarily target equity investments in the range of \$25 million to \$150 million. Denham estimates that the Fund will make fewer than 7 to 8 investments. Denham has identified a robust pipeline of investment opportunities, which reduces blind-pool risk.

Denham Mining Fund’s investment thesis can be summarized as follows:

- Denham Capital Management is a longstanding General Partner with a dedicated mining team comprised of experienced professionals
- Demonstrated expertise in thematic approach to asset selection



# Hamilton Lane

- Partnership with existing management teams has led to a robust pipeline

Hamilton Lane's recommendation is based upon the following analytical factors and is made within the context of Commonwealth of Pennsylvania, Public School Employees' Retirement System's ("PSERS") investment guidelines.

- Detailed due diligence, including interviews with industry peers and private equity professionals. The initial review was completed August 1, 2017; the on-site due diligence was conducted October 3, 2017; the fund was approved by Hamilton Lane's Investment Committee on October 30, 2017 and the recommendation to PSERS was issued October 30, 2017.
- Evaluation of the composition of the investment team, how they work together, compensation structure and other factors that help determine whether a group is likely to be able to replicate past successes as currently configured.
- Detailed Operational Due Diligence, including interviews with Denham's operations team to review the controls and processes surrounding the firm's finance, fund administration, tax, legal, compliance, IT, HR and accounting functions.
- Evaluation of the Fund's proposed investment strategy within the context of the current investment environment.
- The strategy proposed for the Fund is appropriate for the Commodities component of the portfolio.

The individuals at Hamilton Lane who were involved in the due diligence process for the Fund are:

Lars Pace – Principal, Bala Cynwyd Office  
Andrew Bonnarens – Senior Associate, Portland Office  
Dan Mei Lin – Analyst, Bala Cynwyd Office  
Spencer Reiter – Analyst, Bala Cynwyd Office

Based on the above, Hamilton Lane recommends that PSERS commit up to \$150 million in Denham Mining Fund LP. Hamilton Lane makes this recommendation considering the General Partner's qualifications and PSERS' overall investment guidelines.

This recommendation is given solely for the benefit of PSERS and cannot be relied upon by other investors, considering an investment in the Fund, since their needs, objectives and circumstances may not be identical to those of PSERS. The scope of this recommendation is limited to the investment merits of the Fund. Hamilton Lane does not provide legal or other non-investment-related advice.

Sincerely,

Michael Koenig,  
Managing Director

Corina English,  
Vice President