Vector Technologies offers a complete line of high powered VecLoader vacuums for the recovery of mining fines, dust and similar bulk product. VecLoader systems are offered in a wide range of diesel and electric powered configurations. Potential uses include general house-keeping, crushing house cleaning, conveyor spill recovery, bulk transfers between storage vessels, and railcar or barge unloading, as well as cleaning at conveyor transfer points or yard and tunnel cleaning. The unique design of Vector vacuums allows for both wet and dry materials recovery without changeover. Modular designs can be matched to varied requirements and most enhancements can be easily accommodated. Recovered materials can be loaded into dump trucks, dumpsters, and gaylords or even back onto conveyors or into positive pressure conveyance systems.

The VecLoader Titan’s 28” Hg vacuum allows great job flexibility when conveying longer distances, as far as 1,000 feet. Vector self-pulsing baghouses represent thirty years of proven safety and performance. Regardless of power and configuration, each VecLoader model is easily maintained and simple to use, without complicated set-up. VecLoader vacuums are available with premium grade silencers and product specific filtration. Sound levels on electric models can be attenuated to less than 80 to 85 dBA.

DELIVERING MORE EFFICIENCY, FLEXIBILITY AND POWER

VECTOR TECHNOLOGIES LTD. / VACUUM ENGINEERING GROUP/ ROSS COOK BRAND
6820 North 43rd Street/ Milwaukee, WI USA
Phone: 1 414 247-7100/ Fax: 1 414 247-7110/ E-Mail: sales@vector-vacuums.com/ Website: www.vector-vacuums.com

Industrial Vacuum Systems · Hydro Blast Recovery Systems · Dust Collectors · Classifiers · Blast and Recovery Systems Equipment Sales · Parts · Rentals · Service · Solutions
VECTOR TECHNOLOGIES LTD. AND ITS VACUUM ENGINEERING GROUP AND ROSS COOK BRANDS are leading designers and manufacturers of industrial vacuums, abrasive blast and surface preparation equipment, portable dust collectors and baghouses, asbestos and hazardous waste removal equipment, and other conveyance products for hazardous and non-hazardous material handling. Vector designs have set world standards for reliability and performance in a variety of general industrial and specialized markets. Good listening, creative ideas, expert design, quality manufacturing, extensive field tests, and overall responsiveness to customers have helped Vector maintain its position of leadership since 1977. The employees of Vector take great pride in offering dependable, long lasting world-class products at competitive prices.

Vector provides benefits far beyond building the best equipment. Experienced in-field service personnel, local support, extensive parts inventories and a 24-hour assistance line assure readily available technical support. Services include specialized system design, engineering and supplying of central manifold systems, start-up training, preventive maintenance programs, field repairs, and continuing customer education. Additionally, Vector can assist with machine financing and leasing programs.

PRODUCTS
- Central Vacuum Systems
- Mobile Industrial Vacuums
- Vacuum Excavators for Horizontal Directional Drilling
- Combination Vacuum and Jetter Systems
- Cyclonic Baghouses/ Intermediate Separators
- Dust Collectors/ Baghouses
- Abrasive Blasting/ Classifying Equipment
- Asbestos and Hazardous Waste Removal Equipment

CONFIGURATIONS
- Trailer, central, skid or truck mounted
- Vacuums: 5 to 500 Horsepower
  300 to 6,000 CFM/ to 28” Hg
- Dust Collectors: 5,000 to 60,000 CFM
- Electric, diesel, gas, and liquid propane powered

INDUSTRIES
- Mining
- Wood/Paper/Pulp
- Primary Metals
- Nuclear/Asbestos
- Spill Recovery
- Baking
- Carbon
- Surface Preparation
- Vacuum Excavation
- Site Remediation
- General Industrial
- Brick/Refractory
- Hazardous Waste
- Sewer Cleaning
- Hydro Blasting
- Power Plants
- Shipbuilding/Repair
- Foundry
- Emergency Response
- Industrial Cleaning
- Railroad Car Cleaning
- Steel Mills
- Chemicals
- Glass
- Chip & Wafer
- Roofing
- Cement
- Catalyst
- Aerospace
- Clean Room
- Powder Coating
- Waste Water
- Bulk Material
- Plastics
- Pharmaceutical

REPRESENTATIVE CUSTOMERS
VACUUMS FOR MINING- A GENERAL DISCUSSION

COMPANY OVERVIEW
Vector vacuums are among the finest high-powered mobile and in-plant vacuum systems available in the world today. Organizations considering a vacuum system should benefit from Vector Technologies’ over thirty-five years’ experience solving a wide range of conveyance, production, and clean-up problems for numerous industries. Vector vacuums are built at our 42,000 square foot plant in Milwaukee, Wisconsin. Vector’s old-world work ethic and quality of workmanship will become readily apparent during a plant visit.

Just having and old-world work ethic is not enough. Consequently, all Vector equipment is engineered utilizing the latest technologies available. In addition to Computer-Aided Design (CAD), Vector has developed computer programs for vacuum system performance evaluation. The Vector VacCalc program takes into consideration varied factors including the mean and largest material partial size, material density, elevation, humidity, material and ambient temperature, piping and hose system length and diameter, material velocity and others. VacCalc results are then integrated into blower and piping system calculation and analysis programs but equally important they are concurrently coupled to a knowledge base of both practical product and in-field job experience.

TYPICAL CLEANING REQUIREMENTS FOR MINES
Most mining applications, including coal and precious metals, have similar cleaning requirements sharing commonality with cement, fertilizer, plastics and other plants involved in bulk product handling. In brief, mining requirements generally center around spill and dust control.

For mines, vacuum use typically falls under four categories:

1. Dust accumulated in crushing house from crushing or sizing activities.
2. Outdoor conveyor spills and accumulations under the conveyors.
3. Indoor conveyor spills especially at conveyor meeting points, including areas like the crushing house and the pulverizer. Turns and elevation changes often contribute to spills and dust.
4. Indoor dust accumulation from open conveyor emissions, especially in hard to reach areas including pits and tunnels.

In precious metals mining, a significant tonnage of rock is crushed to yield an ounce of claimable gold, silver or copper. These activities generate massive levels of dust, all requiring removal or reprocessing. Historically, much of this recovery effort has been done manually or using a vacuum truck. Vacuum trucks are very expensive and by design require a second handling of collected material. The standard VecLoader vacuum concept will often alleviate the double handling dilemma. Later in this discussion we provide an explanation of how a VecLoader vacuum works and its comparison to vacuum trucks. All of the above cleaning scenarios share the commonality of being housekeeping centered. Across a wide variety of markets, housekeeping is about 85% of Vector’s overall business. In fact, much of Vector’s equipment is sold to cleaning companies that are contracted to perform these duties at mines and industrial plants. The other common factor is that the collected material is generally lying on the ground, not in the air. Once material falls to the ground, the suction required necessitates a high-powered positive displacement vacuum as opposed to a dust collector, baghouse or air-changer. Retrieving dust from the air requires a fan...
style dust collector, a completely different form of air-moving technology. Although the above typical uses focus on dry materials, Vector systems will easily handle liquids and slurries without filter or system changes. This is an important advantage since in many mines the dust accumulates moisture due to rain and other environmental and processing issues. Vector also offers units with explosion protection when there are potential safety concerns related to the collection and vacuum transport of dust. Explosion concerns often come into play with coal.

**AVAILABLE CONFIGURATIONS**
Vector vacuum systems are available in diesel or electric power, on trailers or skids, mobile or permanently mounted. Units are offered with capacities to 25-30 tons per hour and 1200 feet conveyance capabilities.

**DESIGN CONSIDERATIONS**
Often Vector vacuum systems are used to recover dust or fines with the additional requirement of loading the collected material back onto a conveyor. Generally this is accomplished by positioning an intermediate separator or baghouse (often referred to as an intercept hopper) over the conveyor, allowing the material to be “intercepted” and dropped onto the conveyor before it reaches the vacuum. An illustrative drawing is attached, but the process can be visualized left-to-right under the following scenario:

1. Worker with vacuum hose recovering spilled material
2. Operating hose is connected to an intermediate separator which intercepts the incoming material. This could be a self-dumping hopper, a cyclone over the conveyor or another vessel. All these devices share a common attribute; air is slowed down as it reaches the vessel with the decreased velocity allowing the material to drop out of the air stream.
3. The intermediate separator is attached to the vacuum source by hose or piping. However, only very light material (“carry-over”) will reach the vacuum as most material has been intercepted by the intermediate separator.

As previously mentioned, mine cleaning requirements often parallel that of other bulk products, such as cement. The recently provided vacuum for cement plant in Canada, described below, would also be a very effective system for a coal or precious metal mine.

1. The vacuum producer is a trailer mounted VecLoader vacuum, in part used to clean up spills in the yard and on the train tracks. In the mobile application, heavy duty rubber hose is used. Further VecLoader use as a vacuum producer is described below.
2. Dust and spills accumulate in the building where the cement is screened and multiple conveyors and shakers converge. Hard piping runs with flexible hose drops are positioned throughout the building and the piping system runs to the outside of the building allowing connection of the VecLoader vacuum to the piping system.
3. An Intermediate cyclone with metering valve, connected by the hard piping system is integrated into the customer’s positive pressure system. This allows collected materials to be directly dropped into the pressure system for transport, as described below.
4. For twice daily clean-up in the above building, the trailer mounted VecLoader vacuum is connected to the hard piping system providing vacuum. The collected material is intercepted by the Intermediate cyclone before it can reach the vacuum and is dropped out
and metered into the customer’s positive pressure system. Very little material reaches the vacuum as compared to the outdoor cleaning activities described in point 1 above, where all the collected material reaches the vacuum.

Similar systems are offered in copper and gold mines with either skid or trailer mounted Vector systems providing the vacuum power with an intermediate continuous-dump baghouse or cyclone being positioned over the conveyor. In these cases the material is gravity dumped onto the conveyer.

Coal has the same issues. Lots of spills, lots of fine dust. As mentioned above, Vector can build electric or diesel models with explosion protections.

The remaining portion of Vector’s business is product movement from Point A to Point B either by vacuum or by pressure. Vector has developed systems which can pressure load bulk tankers, silos or other vessels at high rates.

The pressure systems are most practical when very large quantities of material are to be moved; for example transferring 80 metric tons per hour from a rail car to a bulk tanker or silo. Pressure systems may also provide a solution where the standard VecLoader cannot reach over the disposal vessel and an in-line intermediate vessel is not viable due to lack of tunnel headroom, weight or other factors. The standard VecLoader can reach between 9’ and 12’ dependent upon design and model so it cannot effectively be placed over a bulk tanker or rail car. A discussion of the VecLoader unloading concept follows.

WHY A VECLOADER VACUUM VERSUS A VACUUM TRUCK?
Vacuum trucks have limitations since vacuum trucks combine its vacuum pump, baghouse/filtration and storage together on a single truck body. As a vacuum truck becomes filled, it must be taken off site to be emptied, or its contents dumped into a pile for re-handling prior to disposal.

The VecLoader Vacuum concept represents a unique approach to high performance industrial vacuuming. VecLoaders do not have to be removed for emptying. Therefore, they can stay on the job full time without the shoveling, hoisting, dumping, and other multiple handling steps required with a vacuum truck or other vacuum systems. Regardless of configuration, each VecLoader model is completely self-contained so it can vacuum and directly discharge wet or dry materials into a bulk bag, dump truck, dumpster, hopper or other collection device. The VecLoader design can also be utilized to return spilled material directly onto conveyors or into varied processing systems. Several VecLoader models feature power equivalent to vacuum trucks at a significantly lower cost and with a far smaller footprint.

The “advantage” to the VecLoader is that unlike the vacuum truck, its storage is not integrated into the system. VecLoader “storage” is the aforementioned dump truck, dumpster, open-top hopper or other collection device.

Vacuumed materials are evacuated from the VecLoader on a variable timed basis, set by the user. The VecLoader’s dump timer creates a vacuum break with collected material automatically
discharged from the baghouse on a preselected cycle. Dump times are established at machine set-up and are easily changed based on the material being collected. On most flowable products, the dump cycle is very short, often in the 10 second range.

The standard VecLoader features a gravity dump door, which opens at vacuum break as controlled by the dump timer. If continuous vacuuming is beneficial to the process, double dumps, rotary valves and intermediate separators are offered. However, these devices require additional maintenance and are costly, and for most applications users determine that continuous vacuuming is not justified. Generally, a 10 second break every 10 “or so” minutes is not critical to the process, especially since the worker often cannot keep pace with the capability of the vacuum.

We hope the above is informative and are interested in the opportunity to work with your organization to improve its efficiency, safety and cost structure. Vector is committed to excellence in product design and customer support. If we can help in any way, call me toll free in North America at 1 (800) 832-4010, extension 1750, or 1 (414) 247-7100. I can be E-Mailed at pres@vector-vacuums.com and faxed at 1 (414) 247-7110. Additional information is available on our web site at www.vector-vacuums.com. We look forward to the opportunity to be of service.

Vector-performance proven vacuum solutions™.

Very truly yours,

Steve Schoenberger

Stephen B. Schoenberger
President

SBS/ars
VecLoader Vacuums for Mining
Vacuum Truck Power with Unique Operating Advantages

More Power!

Better Performance!

Proven Solutions!

For Mining, Vector Technologies offers a complete line of High Mercury VecLoader Titan vacuums. The Titan 28” Hg vacuum provide the greatest flexibility when conveying longer distances or handling dense waste streams such as gold or copper dust sand fines, ore or slurries. The VecLoader self-pulsing baghouse represents a thirty year legacy of proven safety and performance. Regardless of power and configuration, each VecLoader model is simple to use without complicated set-up and easily maintained. All VecLoader units are available with premium grade silencers. Electric Models can be attenuated to under 85 dBA where beneficial.

Use as stand alone systems or combine with baghouses for proven performance for—
Conveyor Spills ~ Crusher House Cleaning ~ Product Recovery
Material Transport ~ Filter Beds Cleaning ~ Improved Air Quality

Call 1 414.247.7100 or U.S. Toll Free 1 800.832.4010
DELIBERATING MORE EFFICIENCY, FLEXIBILITY AND POWER
### US SPECIFICATIONS - SELECT DIESEL MODELS - OTHER MODELS AVAILABLE

SIMILARLY POWERED UNITS ARE ALSO AVAILABLE WITH ELECTRIC MOTORS

<table>
<thead>
<tr>
<th>Models</th>
<th>Mini-VecLoader 100</th>
<th>616 HP</th>
<th>624</th>
<th>721</th>
<th>6100HP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum CFM/Hg</strong></td>
<td>1,340/28&quot;</td>
<td>2,367/28&quot;</td>
<td>3,510/16&quot;</td>
<td>3,660/28&quot;</td>
<td>6,150/28&quot;</td>
</tr>
<tr>
<td><strong>Horsepower</strong></td>
<td>100</td>
<td>170</td>
<td>155</td>
<td>235</td>
<td>350</td>
</tr>
<tr>
<td><strong>Primary Filtration</strong></td>
<td>Coated bags</td>
<td>Coated bags</td>
<td>Coated bags</td>
<td>Coated bags</td>
<td>Coated bags</td>
</tr>
<tr>
<td></td>
<td>pulse air cleaned</td>
<td>pulse air cleaned</td>
<td>pulse air cleaned</td>
<td>pulse air cleaned</td>
<td>pulse air cleaned</td>
</tr>
<tr>
<td><strong>Secondary Filtration</strong></td>
<td>Pleated cartridge</td>
<td>Pleated cartridge</td>
<td>Pleated cartridge</td>
<td>Pleated cartridge</td>
<td>Pleated cartridge</td>
</tr>
<tr>
<td><strong>Maximum Hose Diameter</strong></td>
<td>4&quot;</td>
<td>5&quot;</td>
<td>6&quot;</td>
<td>6&quot;</td>
<td>6&quot;</td>
</tr>
<tr>
<td><strong>Dimensions (L, W, H)</strong></td>
<td>16' 1&quot;, 7' 2&quot;, 10' 0&quot;</td>
<td>17' 5&quot;, 8' .5&quot;, 11' 2.5&quot;</td>
<td>17' 5&quot;, 8' .5&quot;, 11' 2.5&quot;</td>
<td>21' 0&quot;, 8' 2.5&quot;, 11' 4&quot;</td>
<td>24' 10&quot;, 8' 4&quot;, 11' 4&quot;</td>
</tr>
<tr>
<td><strong>Empty Weight</strong></td>
<td>8,100#</td>
<td>10,500#</td>
<td>10,500#</td>
<td>13,950#</td>
<td>22,350#</td>
</tr>
<tr>
<td><strong>Maximum Conveying</strong></td>
<td>1,200'</td>
<td>1,200'</td>
<td>600'</td>
<td>1,200'</td>
<td>1,200'</td>
</tr>
<tr>
<td><strong>Maximum Performance/Bulk</strong></td>
<td>5-7 tons/hr.</td>
<td>10-12 tons/hr.</td>
<td>12-15 tons/hr.</td>
<td>15-18 tons/hr.</td>
<td>23-27 tons/hr.</td>
</tr>
<tr>
<td><strong>Maximum Performance/Liquid</strong></td>
<td>115 gallons/min.</td>
<td>300 gallons/min.</td>
<td>325 gallons/min.</td>
<td>425 gallons/min.</td>
<td>550 gallons/min.</td>
</tr>
</tbody>
</table>

*Performance figures are averages based on easily conveyed products at shorter distances. Many factors will affect vacuum productivity.

**Options and Alternative Designs:**
- **Power:** Diesel, electric, explosion resistant.
- **Mounting:** Road legal trailer, all terrain, skid, truck, and crane.
- **Unloader valves:** Double dump, gravity, rotary airlock, and specialty valves.
- **Filtration:** HEPA, nuclear, carbon, product specific.
- **Accessories:** Cyclones, drum fillers, intermediate hoppers and separators, bagging stations, vacuum hose, specialty nozzles, and engineered solutions.

VecLoaders are extremely powerful and compact vacuum systems, incorporating innovative technology to solve a wide range of industrial vacuuming and conveyance needs. They move coal, ash, dirt, blast media, sand, stone, water, slurry and other flowable bulk materials utilizing either four, five or six inch diameter hose or multiple smaller diameter hoses. Modular in design, VecLoaders can be easily matched to a broad assortment of customer specified cyclone separators, filter-receivers, collections systems, classifiers, self-dumping hoppers and intermediate collection devices. Specifications subject to change without notice so that improvements are made as quickly as possible.

**Call 1(414) 247-7100 or U.S. Toll Free 1(800) 832-4010**

**DELIVERING MORE EFFICIENCY, FLEXIBILITY AND POWER**