Key Milestone
Achieved from Ashram’s Pilot Plant Operations

Today, Commerce Resources Corp. provided an update on the progress of the pilot plant for its Ashram REE Deposit in Quebec, Canada. The results demonstrate the robustness and scalability of the fundamentally critical front-end metallurgical process as the larger pilot scale is achieving even better results than the smaller bench scale.

The main take-aways from today’s news are as follows:

• Best results to date: The company achieved the same recovery (71%) as before on small/bench scale but managed to improve the grade from 44% to 46% TREO now on the larger/pilot scale, which is more reflective of a commercial operation.
• **Further upside for improvements:** There appears to be even more room for further improvements as the process is not yet optimized.

• **Successful scale-up:** The company has not only produced the best ever results in terms of mineral concentrate grade, but it was done by demonstrating that they can scale-up the flotation circuit as well as the leaching circuit, which are the most technically challenging parts of the front-end flowsheet. The front-end flowsheet is made up of 3 main process circuits/phases: 1) **Flotation,** 2) **Leaching,** and 3) **Magnetic separation** (After flotation, a concentrate is produced, which is then leached, with the residue then taken through magnetic separation to produce a final mineral concentrate.)

The first 2 circuits have now been piloted successfully, where it was demonstrated that the flotation and leach processes are scalable. In order to test and confirm that the residue from the leach was good and appropriate as targeted, they first ran it through magnetics (WHIMS) on a smaller/bench scale, which produced very good results, so they know that the leach worked and confirmed that it separated well. Thus, the WHIMS just confirmed that the first 2 circuits were fully successful (it confirmed that the process is scalable for the flotation and leach).

Generally, the first 2 circuits/phases are the most critical (i.e. technically challenging), especially on a pilot level which is on a much larger scale than the bench scale. **Multiplier Effect:** When you notice a small operational or performance issue with an element in a small sample on bench scale, this may often lead to a big issue on the pilot level. Commerce confirmed today that everything they did on bench scale can be replicated on a much larger/pilot level, without any significant issues. This is a major milestone for the company going forward.

In addition, when testing the first 2 phases (flotation and leach), materials are consumed. In the magnetic separation however, apart from assays, no materials are consumed, which gives a lot more room for development and thus is more versatile and cost-effective. The magnetic separation remains to be tested on pilot level but no major issues are expected with that 3rd phase based on data collected to date.

**CONCLUSION**

Typically, it’s the pilot plant level where things can often go unexpectedly wrong or where small issues, recognized at bench scale, multiply into big problems at large, more commercial like levels. Thankfully, as taken from today’s news, this is not the case with Commerce Resources and the pilot plant for its Ashram REE Deposit as it achieved a key milestone with the highest grade of a mineral concentrate ever produced at significant recovery by the company, and whereas this was achieved at a crucial large scale (pilot level). Rockstone is not aware of any other junior REE company ever having produced anything equivalent to this on a large scale, and further, where there is still room for further improvement.

As it is said “Bigger is Better” – and this statement has never been more true than when it is applied to the metallurgy for a resource project. As when any company looks to scale up from successful metallurgy on the laboratory sized sample (also called the bench scale), to the pilot plant level, this may mean an increase of anywhere from ten times, and up to several thousand times larger sample size. This exponential increase in size should give you, in your mind’s eye, a picture of the scales of Blind Justice – that is, of the **Multiplier Effect,** which holds both the promise of the successful repeat of the process, or the possibility that the overall process when scaled up to the larger sample size, simply does not work. This is to say that small negative items on the smaller sample size are actually increased on the larger sample size to the extent that they become a “flow sheet killer.” This is why successfully piloting is so critical to the success of a project.

No-one should ever expect exactly the same set of results on the larger sample size; there are just too many variables and too much that can go wrong when sample size is amplified to such an extent as it needs to be done in this industry.

However, in the case of Ashram, they have not only successfully repeated the smaller sample size results, they have actually had an improvement with the production of the highest grade mineral concentrate that the company has ever produced, and on the largest sample size the company has ever used!

Commerce has now successfully scaled up the process, which has derisked the entire project substantially, while at the same time improved the grade of the mineral concentrate. These are 2 very valuable aspects to note.

More news in this respect is expected during the next weeks giving the sound impression that Commerce is on the right track with its pilot plant, ultimately supplying samples of a mixed rare earth carbonate/chloride concentrate to potential joint venture partners.

Commerce’s President, Chris Grove, commented in today’s press release:

“We are highly encouraged by these results from the 2nd Phase of the pilot plant program. The production of these high-grade mineral concentrates using piloted material as feed is a significant milestone, with the ongoing program continuing to demonstrate that the flowsheet for the Ashram Deposit is simple, robust, and scalable using standard commercial methods.”

The next Rockstone article is already in the making providing a straight-forward comparison between Commerce Resources and Lynas Corp., as well as giving reasons why Lynas is still in production today.
The work was completed as part of the 2nd Phase of the pilot plant, designed to leach bulk flotation concentrate produced during the first phase of the pilot plant. Both continuous and batch leach pilots have now been completed, as well as bench scale testing of the piloted material through to a final mineral concentrate to date from the Company’s 100% owned Ashram Rare Earth Deposit.

The objective of the continuous pilot is to demonstrate the leach process (using HCl) on a continuous and scaled up basis (<4 kg to >150 kg) to evaluate material handling and performance in a manner similar to a commercial operation. The objective of the batch leach pilot is to demonstrate additional scale up (<4 kg to >300 kg) and to produce larger quantities of leach residue at the defined parameters.

The continuous leach pilot was comprised of a series of eight glass cascading vessels that was fed flotation concentrate continuously (154 kg total) for a period of 145 hours, producing 47 kg of primary leach residue. The batch leach pilot was comprised of one large vat that was fed flotation concentrate in one single dose (i.e. batch) of 307 kg, producing 100 kg of primary leach residue. A secondary leach was completed on the batch pilot residue with the combined overall REE recovery exceeding 99%, as targeted.

In order to fully evaluate the quality of the residues produced from the leach pilot plant, several samples were bench processed through the Wet High Intensity Magnetic Separation (WHIMS) stage to produce a final mineral concentrate to use for downstream hydrometallurgical processing. This testwork produced the best mineral concentrate to date for the Ashram Deposit, with potential for additional improvement remaining (Table 1). The pilot plant results to date (flotation and leach) are encouraging and indicate that the Ashram flowsheet is robust at larger scales and is able to produce rare earth mineral concentrate of >45% TREO at high overall recovery. This compares favorably to major hard-rock producers globally.

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<table>
<thead>
<tr>
<th>Grade (TREO)</th>
<th>Recovery (relative to WHIMS stage)</th>
<th>Recovery* (relative to whole rock)</th>
<th>Mass Pull (relative to whole rock)</th>
<th>WHIMS Process</th>
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</thead>
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<tr>
<td>45.9</td>
<td>78%</td>
<td>~63%</td>
<td>~3%</td>
<td>1 Rougher</td>
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<tr>
<td>45.7</td>
<td>88%</td>
<td>~71%</td>
<td>~3%</td>
<td>1 Rougher – 2 Scavengers</td>
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Table 1. High-grade mineral concentrate produced from leach pilot residue (Test 3889-13)
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