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(54) **IRRIGATION IMPACTS ON A LEACH STOCKPILE**

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(56) **References Cited**

U.S. PATENT DOCUMENTS

5,969,973 A * 10/1999 Bourne G05B 19/4097
700/165
6,319,389 B1 * 11/2001 Fountain C22B 15/0002
75/731

(Continued)

FOREIGN PATENT DOCUMENTS

CA 1293521 12/1991
CA 2573936 5/2010

(Continued)

OTHER PUBLICATIONS

Posted by Paul Moore, "Anglo American utilising latest digital twin technology at Quellaveco," International Mining, <https://im-mining.com>, Dec. 12, 2022.

(Continued)

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(57) **ABSTRACT**

The system may include a secondary irrigation feature that determines a percent of overlap of each of a plurality of submodules in a second lift over each of a plurality of submodules in a first lift and adjusts at least one of leaching operations or a leaching model based on the total tonnage weighted average of metal in the second lift. The method may further comprise determining an acid gap based on a

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