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Mohammad Parsa, Abbas Maghsoudi



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1 **Controls on Mississippi Valley-Type Zn-Pb mineralization in** 2 **Behabad district, Central Iran: Constraints from spatial and** 3 **numerical analyses**

4 Mohammad Parsa¹, Abbas Maghsoudi^{✉, 1}

5 ¹*Faculty of Mining and Metallurgical Engineering, Amirkabir University of Technology, Tehran, Iran*

6 **Abstract**

7 The Behabad district, located in the central Iranian microcontinent, contains numerous
8 epigenetic stratabound carbonate-hosted Zn-Pb ore bodies. The mineralizations formed as
9 fault, fracture and karst fillings in the Permian-Triassic formations, especially in Middle
10 Triassic dolostones, and comprise mainly non-sulfides zinc ores. These are all interpreted as
11 Mississippi Valley-type (MVT) base metal deposits. From an economic geological point of
12 view, it is imperative to recognize the processes that have plausibly controlled the
13 emplacement of MVT Zn-Pb mineralization in the Behabad district. To address the foregoing
14 issue, analyses of the spatial distribution of mineral deposits comprising Fry and fractal
15 techniques and analysis of the spatial association of mineral deposits with geological features
16 using distance distribution analysis were applied to assess the regional-scale processes that
17 could have operated in the distribution of MVT Zn-Pb deposits in the district. The obtained
18 results based on these analytical techniques show the main trends of the occurrences are NW–
19 SE and NE-SW, which are parallel or subparallel to the major northwest and northeast
20 trending faults, supporting the idea that these particular faults could have acted as the main
21 conduits for transport of mineral-bearing fluids. The results of these analyses also suggest
22 that Permian-Triassic brittle carbonate sedimentary rocks have served as the lithological
23 controls on MVT mineralization in the Behabad district as they are spatially and temporally
24 associated with mineralization.

25 **Keywords:** *MVT Zn-Pb mineralization; Structural controls; Fractal analysis; Fry analysis;*
26 *Iran.*

✉ Corresponding author at faculty of Mining and Metallurgical Engineering, Amirkabir University of Technology, Tehran, Iran. Email Addresses: Mohammad Parsa: m.parsasadr@aut.ac.ir; Abbas Maghsoudi: a.maghsoudi@aut.ac.ir.

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