

EXPLORATION FOR NON-METALLIC DEPOSITS USING REMOTE SENSING IN SAN FELIPE GUANAJUATO, MEXICO

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The municipality of San Felipe, Guanajuato, Mexico, is located in the Mesa Central. The geology of this region consists mainly of Tertiary volcanic rocks and numerous quaternary alluvial fans. This region is famous for its production of Talavera tile and glassware. Production of Talavera requires special clay that has been exploited intermittently by artisans. Consejo de Recursos Minerales (COREMI), and Fomento Minero del Estado de Guanajuato (FMEG) conducted sampling in this region, and it was determined that it was necessary to implement the use of remote sensing, follow by field work to confirm the interpretation.

The geological data were evaluated using geospatial analysis, resulting equation (A). Factors considered include the composition of the rock, the volume of the deposit, the composition of clay minerals, geological setting, and the distance between samples of the same characteristics. Applying equation (A) identify seven deposits (Table 1). These deposits were sampled and their volumes were quantified. Finally, a Geological Information System that shows the deposits in three-dimensions was generated.

$$G_{EQ} + V_4^{10} + \check{O}_Q + \check{G}_G = \text{Zones} \quad (A)$$

D

G_{EQ} is the rock composition, V_4^{10} volume more than 10,000 m³ (ton > 25,000 ton.), \check{O}_Q clay mineral composition. SiO₂ 60 - 67%; Al₂O₃ 15 - 21%; CaO 0.3 - 4.0%; MgO 1.0 - 1.6%; Na₂O 0.4 - 1.5%; K₂O 2.0 - 5.4%; Fe₂O₃ 4.0 - 5.8%. The geological setting \check{G}_G , D size of the area sample (1,000 m).

Table 1 : Results of geospatial analysis of seven deposits.

Zones	Volume (m3)	Substances	Geologic Classification*
Zone I	323,050	Clay	G _{IC}
	93,635	Clay	G _{IC} , G _{AA}
Zone II	70,588	Clay	G _{AA}
	31,668	Clay	G _{AA}
Zone III	105,600	Clay	G _{AA}
	87,685	Clay	G _{AA}
Zone IV	1,842,120	Ornamental's rocks	G _{AA}
	8,160	Clay	G _{AA}
	89,600	Clay	G _{ISM}
Zone V	12'763,080	Ornamental's rocks	G _{AA}
	205,587	Clay	G _{AA}
Zone VI	315,000	Clay	G _{AA}
	24,640	Clay	G _{TSC}
Zone VII	2'445,000	Ornamental's rocks	G _{TSC}

*G_{AA} Alluvial fans; G_{IC} Ignimbrite; G_{ISM} Ignimbrite Santa Maria. G_{TSC} Tertiary Superior Continental.