

MEXICO MINERAL RESOURCES

Comments From an Explorationist

Introductory Remarks

Factors Affecting Mineral Resource Development

Mexico' Investment Climate—Brief History

Resource Finders, Evaluators, Developers

Experiences as a Resource Finder

Future Resources: What, Where and How

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Factors Affecting Mineral Resource Development

- Geologic Factors & Logistics
- Commodity Prices & Demand
- Technology
- Social Events
- Government Policies

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Commodity Prices

Technology

- Improved production methods
- Demand for New Commodities

Social Events

- Mexican Revolution
- Narco Wars
- Ejidos & communal lands
- New international partners—Asia

Government Policies & Enforcement

- Claim management: Agencia de Minas
- Permitting

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Mexico's Investment Climate—Brief Historical Review of Government Policies

- Porfiriato Years 1877 – 1911
 - Opened Mexico to investment: investors poured in
 - Foreigners could own 100% interest in mineral concessions & mines
 - Many different mineral commodities developed; focus on precious metals
 - Many smelters constructed
- Mexican Revolution Years 1910 – 1930
 - Tumultuous years: production fell, many mines closed and never re-opened
 - Investment stalled; foreigners abandoned properties
- Asarco Years 1930 – 1960
 - Larger foreign-owned companies exploiting mostly base metals (Pb-Zn-Ag) (Cu) were dominant
 - Technological change favored large, better financed companies; large mine & mill complexes (mining “camps”)
 - Smelters & froth flotation milling
 - War years & demand for other commodities
 - Mercury & antimony
 - Barite & fluorspar
 - Mining industry was an important source of employment, exports & tax revenues
 - Relative importance of mining industry diminished as other economic sectors grew

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- **Mexicanization Years 1961 – 1990**
- Growing sense of nationalism in Mexico & much of Latin America in late 1950's
 - Foreign investments expropriated & industries nationalized
 - Foreign mining companies perceived as exploiters with little return to Mexican people
- Mexicanization Law of 1961
 - Mines & concessions required to be majority owned by Mexican citizens
 - Mexican nationals control management: CEO and majority of board seats
 - Onerous taxes on non-Mexicanized companies
- Foreign investment scene greatly changed
 - Several foreign companies sold entire interest to Mexican investors
 - Asarco one of the last to Mexicanize and eventually to sell its interests

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Mexico under the Mexicanization Law

- Significant new investment by Mexican investor groups at the beginning of the Mexicanization period
 - Foreign companies reduced investment to update & maintain mines & mills
 - Low metal prices & high taxes
 - Concerns about changes regarding foreign ownership
- Industry structure was little changed; a few large companies dominated the industry
 - Industria Minera Mexico (Asarco); Penoles (American Metals); Minera Frisco (San Francisco del Oro)
 - Smaller mining companies & independents languished
 - Lack of new capital to explore, develop, maintain mines & prospects
- Foreign investment was very limited; economics was unfavorable
 - Many investors chose not to be minority owners
 - High taxes, especially on dividends taken out of Mexico
 - Some exceptions; copper exploration in Sonora
- New mineral deposit discoveries were made
 - La Caridad (Asarco Mexicana jointly with United Nations); began production in 1979
 - Fresnillo (Penoles) new discoveries in 1975
 - Real de Angeles (Minera Frisco developed a discovery made by Noranda subsidiary) 1982
 - Hercules (Fomento Minera) late 1960's

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Mexico under the Mexicanization Law

- Mining industry stagnated over time; outmoded technology
 - Low metal prices
 - Inadequate capital investment
 - Little new exploration
 - Excessive government regulation
- Mexican Federal Government became more directly involved in the mineral industry
 - Became a major competitor to private companies
 - Nationalized parts of the mining industry
 - Cananea
 - Real del Monte
 - Restricted several mineral commodities to the federal government
 - Coal, iron ore, uranium, sulfur, titanium, phosphate rock
 - Government established large “reserve areas” with exclusive rights to explore & exploit minerals
- Government involvement in mineral industry became increasingly less popular
 - Government companies were inefficient money losers
 - Reserve areas restricted new exploration
- Government began to divest its industry interests beginning in 1983

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Post-Mexicanization

- President Carlos Salinas de Gotari (1988) began a push to open all sectors of Mexico's economy to foreign investment
- Trusts: a cumbersome first step (1990)
 - The 51% Mexican interest could be placed in a trust controlled by foreign investors
 - Control of trust gave 100% controlling interest to foreigners
 - Stimulated foreign investors; foreign investment in mineral industry revived somewhat
- Mining Law of 1992 brought significant changes
 - Foreigners could own 100% of exploration and mineral production
 - Coal, iron, sulfur, phosphorous and other mineral commodities no longer restricted
 - Mineral reserve areas were eliminated
 - Door to foreign investment was open again
 - Opening coincided with active world-wide exploration for gold
- Exploration in Mexico boomed!
 - Major international companies
 - Canadian junior companies
 - Old-line Mexican mining companies had real competition for the first time
- Open Economy; Good times are here at last! Wait, not so fast!!

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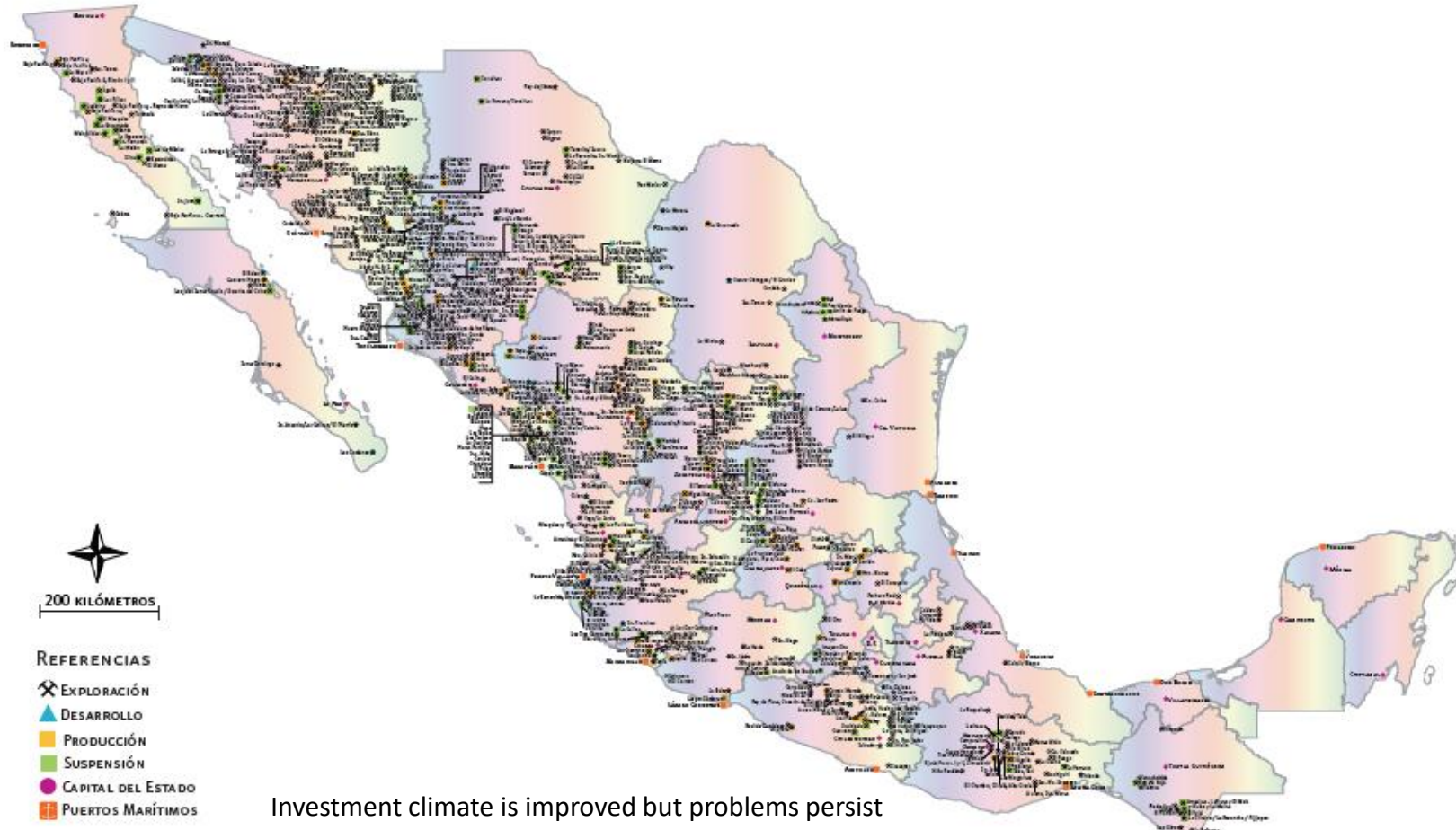
Mexico Mining: Facing Economic & Exploration/Development Realities

- Mexico' new exploration boom lasted 4 years.
 - Lower gold prices killed investor enthusiasm; funds for juniors dried up
 - Lack of exploration success forced cutbacks and suspension of exploration
- Difficulties for exploration became evident
 - Lack of basic maps and geologic studies
 - Difficult infrastructure
 - Numerous old concessions
 - Limited experienced explorationists
- Results of 1990's exploration a disappointment to foreign exploration companies & to Mexican government
- Gradual acceleration in activity by foreigners investors—led by Canadian Junior Companies

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SECRETARIA DE ECONOMIA

PROYECTOS MINEROS DE EMPRESAS CON CAPITAL EXTRANJERO



Investment climate is improved but problems persist

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Resource Finders, Evaluators, and Developers -- Three Basic Steps

- Resource Finders (Prospect Generators) – Identify specific prospect with potential to be an economic deposit
 - Geologic concept
 - Compatible with investor criteria: commodity, minimal size & grade, location, etc.
 - Information review
 - Field examination (Critical Step)
 - Interpretation of geology
 - Ownership status & history
 - Imagination
 - Prospect generation can be through business analysis—purchase acquisitions; mergers; joint ventures
- Resource Evaluators – Generating detailed specific information
 - Quality and size, geometry
 - Detailed economic evaluation
 - Preliminary Resource Estimate; Preliminary Economic Assessment; Pre-feasibility; Bankable feasibility
- Developers
 - Financiers, Engineers, Metallurgists, Marketers

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Experiences as a Resource Finder

- Worked mostly as a prospect generator, an independent contractor or consultant
- Clients
 - Mostly large international mining companies: Kennecott; Rio Tinto; Phelps Dodge; Freeport McMoran
 - Some smaller companies & Canadian Juniors
 - Visa restrictions for foreigners working in Mexico
- Mexicanization Period late 1970's – early mid 1980's
 - Little activity
 - U.S. investor groups looking at specific properties
 - Mexican investor groups looking for foreign investors
 - Taxes were the main disincentive
 - Lack of infrastructure stands out in my memory; Batopilas

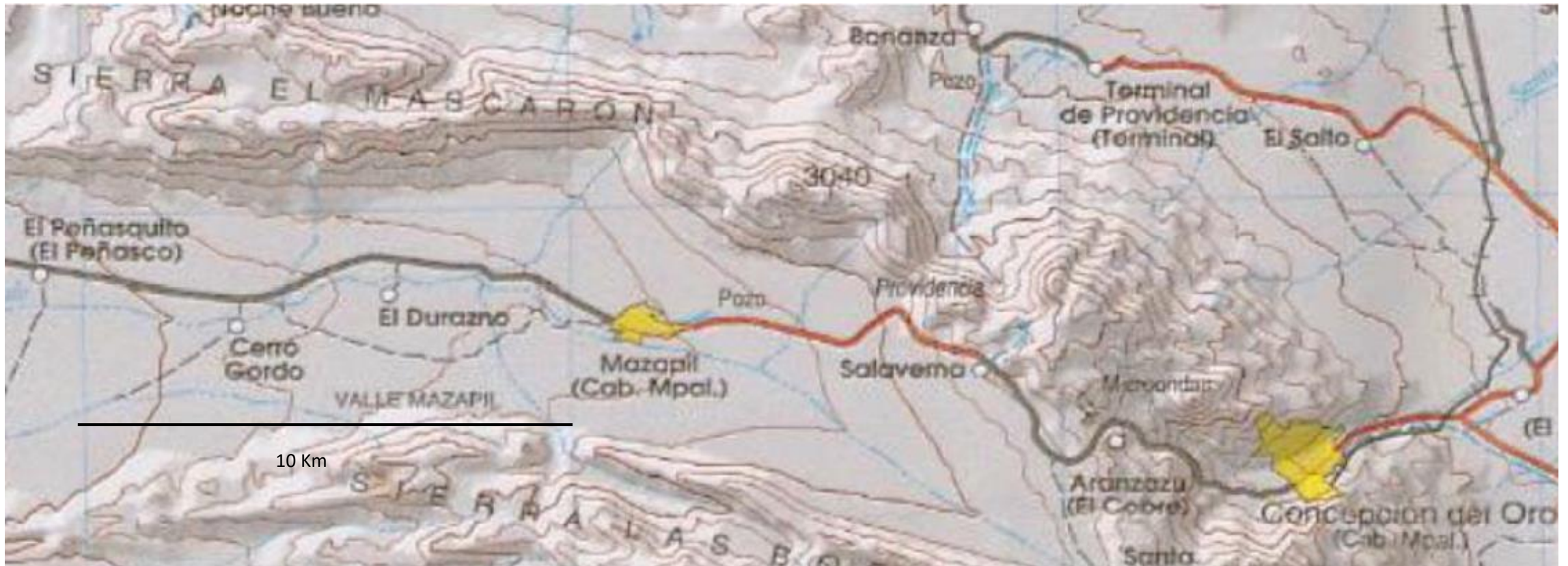
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Mexicanization Period late 1980's – 1991

- Active exploration for Minera Kennecott began in 1988
 - Few American geologists with experience in Mexico
 - Basic data were limited
 - Published literature was sparse; specific property reports in private files most dating pre-1970
 - Topographic maps were just becoming available
 - CRM reports difficult to access
- Kennecott's early efforts directed toward broad scale reconnaissance to identify prospective "Kennecott size" districts or prospects
 - My task was generative reconnaissance; worked alone; notified Kennecott when I had something of interest to show
- Concepcion del Oro District identified as very prospective—a mega district
 - Geology varied & complex
 - Long history of production but not well explored by modern standards
 - A lonely world in those days; being on the ground pays off

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Peñasquito & Salaverna—A Shared Exploration History



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1991 – 2000

- Foreign exploration accelerated; most activity in Sonora and later Sierra Madre Occidental
- My generative work for Kennecott focused on central Mexico: Chihuahua; Coahuila; Durango; Zacatecas; San Luis Potosi
 - Still a lonely planet
 - Gambusinos & independent mine owners
 - Commodity focus changed: gold; Pb-Zn-Ag; copper-gold
 - Identified a number of prospects that Kennecott drilled
- Rio Tinto Titanium; beach prospecting—tough work but somebody has to do it.
 - Pluma Hidalgo bedrock rutile
- 2000: Kennecott closed their Mexico office and gave up Mexico exploration
- Phelps Dodge: expanded interest in commodities and in central Mexico
- Freeport McMoran: copper possibilities central & eastern Mexico
 - Narco wars & mineral exploration
- Freeport little active in Mexico; most of the large international companies have gone or have minimal programs

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Disappointments & Successes

- Disappointments—Opportunities Missed
 - Poor decision; Geology miss: Sabinas, Durango
 - Client deposit size criteria: Several properties in the Sierra
- Poor corporate management decisions
 - Fresnillo Tayahua (Concepcion del Oro)
 - Peñasquito Santa Maria de la Paz
 - Other prospects with potential for large deposits
- Successes
 - Satisfaction from work well done
 - Penasquito
 - Nieves
 - Pluma Hidalgo

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Mexico Mineral Resource Future: What, Where, How

What

- Silver & gold
- Base metals: copper, Pb-Zn-Ag
- Industrial Minerals

Where

- Sierra Madre Occidental
- Remote northern areas (Coahuila & Chihuahua)
- Altiplano
- Central & Southern Mexico (Industrial Minerals)

How

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How

- **Strategy**
 - Clearly define objectives; must know what you are looking for and where to search
 - Define your niche and stay in it; stay focused
 - Planned objectives & expectations must be reasonable to business people & to technical people
 - Be dedicated to the long term
- **Prospect generation—single most important step**
 - Every company needs a “Rain Maker”, those who can generate good prospects
 - Good ideas are essential; Good prospects yield discoveries
 - Broad understanding of geology; field time is essential
 - Camino Rojo
 - Be imaginative; always ask “what if”, but be realistic
 - Be willing to try something different
 - Don’t be overly reliant on existing reports; be prepared to draw your own conclusions
 - History is important

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