Survey of Mineral Industry on Techniques, Parties, Costs, Acreages, and Times For Exploration, Development, and Production of Various Mineral Occurrence Types in the Onshore United States

A. Introduction

During the conduct of the study, it became apparent that consideration of many critical areas of the Federal onshore mineral laws, such as diligence requirements, acreage limits, length of tenure, ability of industry to pay royalties, roles of prospectors and small exploration groups, assessment work, and other areas, could be greatly improved by collection and presentation of basic data on the techniques, parties, costs, acreages, and times involved in exploitation of various types of mineral deposits,

Such basic data were not available in the detail, completeness, and form required for useful analysis. Therefore, with the assistance of the Advisory Committee for this study, the Office of Technology Assessment (OTA) prepared a questionnaire and forms to obtain such data from industry. The questionnaire is reprinted in edited form in section B below. Summary tables for each of the four general categories of mineral occurrence types are presented in section C, followed by the completed forms for each individual mineral occurrence type (the forms are arranged in the same order as the mineral occurrence types in the summary tables).

Each form was filled out by an active mineral explorationist knowledgeable on the particular mineral occurrence type and employed by (or consultant to) one of the larger companies exploring for such occurrences, under the overall direction of the heads of the exploration groups of such companies. The companies involved were AMAX Inc., Anaconda, ASARCO Inc., Homestake Mining Company, Mobil Oil Company, Occidental Minerals Corporation, and Texasgulf Inc. Ray E. Gilbert, a mineral exploration consultant, also contributed data.

The Office of Technology Assessment greatly appreciates the cooperation of these individuals and companies and is particularly appreciative of the efforts of Leo Miller and George Erdosh of Texasgulf Inc., who coordinated the data gathering effort.

The forms were filled out under a very short time constraint and were meant to indicate orders-of-magnitude rather than precise statistics.

B. The Questionnaire OTA Survey of Mineral Industry on Techniques, Parties, Costs, Acreages, and Times for Exploitation of Various Mineral Occurrence Types on Onshore U.S. Land

The office of Technology Assessment of the U.S. Congress is a research arm of the Congress that is charged with providing accurate and objective information to the Congress in areas designated by chairpersons of congressional committees or by OTA'S bipartisan Congressional Board.

OTA is currently engaged in a study of the Federal onshore mineral and mining laws for use by the Congress, particularly the Senate Committee on Energy and Natural Resources and the House Committee on Interior and Insular Affairs. It is expected that the study will be relied upon heavily by those committees and by officials in the executive branch in formulating and considering various proposed revisions to the Federal onshore mining and mineral leasing laws.

Consideration of many critical areas of the laws, such as diligence requirements, acreage limits, length of tenure, ability of industry to pay royalties, role of prospectors and small exploration groups, assessment work, and other areas, could be greatly improved by collection and presentation of basic data on the techniques, parties, costs, acreages, and times involved in exploitation of various types of mineral deposits. This survey is intended to gather such data.

1. The Forms

Table C. 1 lists the mineral occurrence types for which OTA would like to obtain data. [Table C. I has been moved to section C.] Although data on each type is not necessary, it is hoped that all of the more significant types, such as Marine Sedimentary (Oil and Gas) and Vein and Replacement Deposits [Gold, Silver, Copper. Etc.) will be covered. Complete coverage, of course, would provide the best data source for analysis and use.

The types are divided into four categories which appear to present different sorts of problems in exploitation: surficial, stratabound-extensive. stratabound-discrete, and discordant. A good sample of types from each category is essential to the success of the data gathering effort. General descriptions of each category are:

Surficial—generally unconsolidated and unburied mineral deposits resulting from weathering or deposition during late geologic time;

Stratabound-extensive—large laterally continuous mineral deposits confined to a single stratigraphic unit;

Stratabound-discrete-randomly distributed and/or discontinuous mineral deposits, essentially confined to specific stratigraphic units; and

Discordant-mineral deposits that transect strata and/or are related to intrusive rocks, volcanic activity, etc.

Form 1 is to be used to provide summary statistics for each of the mineral occurrence types listed in table C.1. Form 1 asks for data on the range (minimum. average, maximum) of cost, acreage, and time required by different individuals and companies for different deposits of the same type. Care should be taken to make sure the ranges include the smallest as well as the largest type of operation. If there is a great variation in cost, acreage, or time between larger and smaller participants, the variation and the reason for it should be noted (e.g., in the Additional Comments column). Only data for onshore mineral exploitation in the United States or similar areas (e.g., Canada) should be used. If no U.S. data is available, foreign data can be used to estimate what the costs, acreages, and times would be in the United States. (Indicate on form, in Additional Comments column, that foreign data was used as basis for estimate.)

The data used for form 1 should include data on failures as well as successes in exploration, development, and production. This should be fairly easy to do since the form is broken down into four exploration stages in addition to development and production, and it is also broken down for each stage into the techniques used. Thus, data can be listed by technique in each stage, whether the technique was successful or not in a particular case, so that a larger sample of data is used which more accurately reflects the overall aggregate costs of a mineral exploitation program or project. (Note that separate listing of the data for successes and failures is not requested; it is merely desired that all available data be used to estimate the range of costs, acreages, and times for a particular technique or stage of exploitation.)

Preferably, the ranges should be for mineral exploitation on Federal land in the Western United States exclusive of Alaska. The Additional Comments column should be used to indicate any substantial variations from this range for areas such as Alaska or the Midwest (if appropriate, simply give percentage increase or decrease). If data is only available for an area other than the Western United States, either estimate the data for occurrences in the Western United States from similar deposits elsewhere or give the data for the other deposits—in either case, explain in the Additional Comments column.

2. Detailed Instructions

OTA form 1 is merely an expansion of the mineral exploitation activities, methods, costs, and times tables prepared by Paul Bailly of Occidental Minerals Corporation for various conferences and workshops. An example of one of Bailly's tables, listing 10 different ventures, is attached to this questionnaire [the table has been moved to section C], and it should indicate the distinctions between the two stages of Target identification and the two stages of Target Investigation on form 1. Form 1 also includes the development and production stages, which have their traditional meaning. The Bailly example also illustrates the sorts of techniques (activities or methods) that should be listed and the use of O, F, or L to indicate whether the technique is an Office, Field, or Laboratory method or activity. It is not necessary to list land acquisition as a separate activity on Form 1; however, if land acquisition costs are included, they should be listed separately from all other costs in the appropriate stage.

Explanations and instructions for each column heading on Form 1 are presented immediately below. Form 1 usually calls for minimum, average, and maximum figures.

Main Activities and Methods: see Bailly example.

0.F. or L: Office, Field, or Laboratory—see Bailly example.

1.S. M, or L: Individual prospector or explorationist, Small firm or group of individuals, Medium-sized firm, or Large firm. For Form 1, give percentage which each group (I, S, M, or L) makes up of those performing each activity (or participating at each stage) of the exploitation of the mineral occurrence type. Do not count, e.g., an individual as an I participant if he or she is funded by an S, M, or L participant. Arbitrary definitions of I, S, M, and L are: I—no more than 2 people working together spending less than \$10,000 per year on mineral exploitation; S— no more than 50 people working together spending less than \$250,000 per year; M—expenditures of less than \$2,500,000 per year; L—expenditures of \$2,500,000 or more per year. [Note: Some respondents, instead of listing quantitative percentages of participation, used an "X" to indicate participation by one or more of the four categories of participants.]

Direct Cost; Cost exclusive of land acquisition cost, taxes, etc., which however can be listed separately from all direct costs. Costs should be reported in 1977 dollars (i.e., past costs should be adjusted to current equivalent 1977 figures). Overhead should be reported, but separately from direct costs as either a dollar figure or a percentage of direct costs.

Area Being Investigated, Area Covered: Area in square miles covered by activity or to which technique is applied, which is usually distinct from:

Area Under Cluim, Option, Lease, Etc: Area in acres for which exploitation rights were acquired or optioned prior to activity or use of technique.

Duration of Each Stage: Divided into three categories, each reported in months:

Without Any Delays: Time in months required for activity or method in the absence of any delays due to economics, regulatory restrictions, etc. Includes time lost due to normal climatic change in seasons, although any very significant climatic or seasonal loss in time common in a particular geographic region (e.g. Alaska) should be noted in the Additional Comments column, Also includes any normal delay due to company's inability to fund all possible projects simultaneously,

Delays Due to Economics, Technology (Nonregulatory): Delays in addition to normal delays occasioned by, e.g., drop in metal prices, too low an ore grade, lack of technological development (rather than normal wait for delivery or manufacture of on-the-shelf technology),

Delays Due Solely to Regulation; Delays in addition to normal and nonregulatory delays which do not overlap such delays and are caused by governmental orders, restrictions, or refusals to act (e.g., on permit application).

Additional Comments: Any additional comments. Should be used to describe significant variations in costs, times, or acreages resulting from geographic location (e. g., Alaska) or size of participant (e.g., individual prospector versus large firm),

C. Tables and Forms

The following pages contain: (1) the Bailly table and the table of illustrative mineral occurrence types that were attached to the questionnaire, (2) summary tables, one for each of the four general categories of mineral occurrence types, and (3) the completed forms, one for each individual mineral occurrence type. The completed forms, including comments, have not been edited by OTA beyond regrouping of numbers where appropriate.

Main Activities and Methods During the Four Stages of Exploration for Ten Successful Ventures Previous to a Decision that a Profitable Surface Mine Can Be Opened

Exploration Stages	APPRAISAL	RECOMMISSANCE	SURFACE INVESTIGATION OF TANGET AREA (Stage # 3)	DETAILED THREE THREE PHYSICAL PHYSICAL TARGET AREA Shape #4.
Search for a New Porphyry Copper Ore Deposit in Southwest U.S.A.	O beoropic compitation O Photogeologic shuty ricck units and structure. O Structural analysis F-Field inspection at and selected from air and on ground.	Progression of the Control of the Co	Strutural-alteration mapping of buddogs L-Prographic mineral ogy trace element study of rox samples F-Detable finduced Poar- (ration Survey of anomalous covered areas	F. Divinet, C. Logging, Where shopped, With a shopped and physical winds on samples are any any and winds on samples are any
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VENTURE #5 Search for a New Placer Gold-Tin Deposit in Alaska	O-Geologic Compilation* O Pro-ligeringic shifts geumorphongy:	Precomposation Parameter printing Brocomessary eminor Brocomessary	NANCES DESIGNATIONS AND	Spine 2 various and constitute and c
VENTURE #6 Search for a New Phosphate Deposit in Southeastern Coastal U.S.A.	Geologic completion: Study of water well cuttings Printiggeologic study foreinger mapping Geologic free of ex- aumor coar cree of ex-	Artonne Hademetro Suche Suche and Park of subgraph, of subgraph, of subgraph, of subgraph, of subgraph and one Dressing tests, on up- grade vamples.	F Detailed advance of professional survivors outcrops if any	Same as for Vertice # *
VENTURE #7 Search for a New Uranium Deposit in Clastic Formation of Western U.S.A.	O Geologic complation O Photogeologic study -formation mapping releggeography structure	Amorne Hadomence Success Success Macon as a comparation Amorne of comparation P. Deling for strangraph, and faces of ormation	Detailed indigment John Salver John Salver John Salver John Salver John Salver	Same an 'ca' v enture # 1
VENTURE #8 Search for a New Coal Deposit in	O-Geologic compilation marketing area*	F feet check of sections continued and an artifact of the contrassence defined for strategraph, and coal more as a feet of the contrassence of the coal more and the coal more and the coal more and the semples not build build semples not build.		as for Venture #1
VENTURE #9 Search for a New Cement-Grade Limestone Deposit in U.S.A.	O Geologic compilation for marketing area? O Photogeology	Examination of outcrops and sampling. Recommission of other for strategishy and chemical analyses of all innestions samples.		Same as for Venture #1 excluding from those group/sacs
VENTURE #10 Search for a New Gravel Deposit Near Urban Center in U.S.A.	None	O Completion of geologic information for suburban and are all the completion of gravel		Same as to Venture #1 erchony down to be geophysis and fundation

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Table C.1 Illustrative Mineral Occurrence Types

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		STRATABOL	JND-EXTENSIVE	STRATABOU	ND-DISCRETE	DISC	ORDANT
Geologic Environment	Typical Ores	Geologic Enironment	Typical Ores	Geologic Environment	Typical Ores	Geologic Environment	Typical Ores
Aluminous Clays and Latenites	"Bauxite, Kaolinite	Bedded Precambrian	"Iron, Copper, Gold	Marine Sedimentary	'011 and Gas, Bromine, Bante	Breccia Pipes	"Uranium, Molybdenum, Copper, Gold, Diamond
Latentes Stream Placers	"Nickel (Cobalt) Gold, Silver, Platinum Tin, Rare Earths, Iron, Gem Stones	Marine Sedimentary Marine Evaporite	" Phosphate, Iron, 011 Shale, Manganese " Potassium " Sodium "Sulfur, " Gypsum, Lithium,	Continental Sedimentary (Sandstones and Fossil Placers) Lacustrine	" Uranium (Vanadium), Gold, Titanium " Gypsum, " Trona, " Boron	Porphyries Pegmatites	"Copper-Molybdenum, Gold, Tin Lithium, Fluorine, Beryllium, Rare Earths, Mica, Feldspar, Columbium,
Coastal Placers	Titanium, Zirconium, Chromium, Rare Earths, Gem Stones	Continental Sedimentary	Mangesium "Coal, 011 Shale, " Boron, Sodium	Evaporites Fossil Laterites	Bauxite	Veinn and	Tantalum "Gold. "Silver. Copper.
Residual Deposits Brines in	Bante, Iron, Manganese, Titanium, Phosphate, Columbium, Vermiculite "sodium, " Potassium,	Continental Volcanic Stratiform Igneous Complexes	Bentonite "Iron Chromium Platinum Group Metals Vanadium	Young Tuffs and Related Sedimentary Shale Hosted Massive Sulfides	Beryllium, Mercury, Fluorite, Native Sulfur 'Copper-Lead-Zinc-Silver	Replacement Deposits	Alunite, Mercury, Lead, Zinc, Bante, Fluorine, Tungsten, Molybdenum, Uraium. Iron, Graphite, Gem Stones, Native Sulfur, Gilsonite
Evaporites	"Magnesium, " Boron, Lithium. Tungsten			Carbonate Stratiform	"Zinc-Lead-Bante- Fluorine (Copper, Cobalt)	Massive Sulfide Pipes	Copper-Lead-Zinc-Silver (Gold, Pyrite)
Supergene Enrichment	Copper, Silver, Lead, Zinc, Gold, Manganese			Volcanogenic Massive Sulfides Metamorphic	"Copper-Lead-Zinc-Silver (Gold, Pyrite, Bante) Garnet, Kyanite, Graphite	Rhyolitic Volcanic Mafic and Ultra mafic Intrusive	"Tin, Tungsten, Bismuth Nickel-Copper, Olivine
						Podiform Ultramafic	Chromium, Copper, Iron, Nickel, Asbestos
		<u>L</u>				Anorthosite Complexes	Titanium, Iron, Vanadium
*Described in Ad Ho	oc Geological Committee on Re	mote Sensina				Veins in Ultramatic	Asbestos, Talc
	gical Remote Sensing from Spa	J				Veins in Meta- morphosed Dolomites	Talc
						Salt Domes	"Sulfur
						Carbonate and Alkalic Complexes	Phosphate, Rare Earths, Iro Titanium Columbium Copper

Table C.2 Summary Mineral Exploitation Statistics for Surficial Mineral Occurrence Types

	Main Activities and	<u>.</u>	Perc	Percentage	l .	_	Direct Cost (\$000)	st (\$000		• •	Area (Sq. Mi.)	_	Ā	Area (Acres)	_'		3	Tation (DUTATION (MONTHS) OF EACH STAGE) OT E.	3180		T		_
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	copper, silver, etc	o	· ·	32	20	4	12	20	4	-	100	ž	1	1	1	4	- 8	4	4	4	-	-	-		
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Table C.2 (Cont'd)

	Main Activities and	0	Perc	Percentage	_	_	Direct	Direct Cost (\$000)	<u> </u>		(M 28) 4414	ŝ	_	(8004)	í			Duratio	Duration (Months) of Each Stage	the) of	Each S	8	Ì	_
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Table C.3 Summary Mineral Exploitation Statistics for Stratabound Extensive Mineral Occurrence Types

	Main Activities and	0.0	Perce	Percentage			rect Cos	Direct Cost (\$000)							-		3	Tation (DUTATION (MONTHS) OF EACH STADE	0 E	Sp Sted		-		
		سز ہے۔	Act Don	of Each Activity Done by		ο¥	Each Activity athod, Exclu Overhead	of Each Activity or Method, Excluding Overhead		₹ =	Area (Sq. MI.) Being Investigated	 ⊋ ₽	Are Under (Le	Area (Acres) Under Cleim, Option, Lease, Etc.	tion.	₹ g	Without Any Delays		Plus Non- Regulatory Delays	- \$	- 3 "	Plus Delays Due Solely to Requistion	s y s	Additional Comments	
		1-	\vdash	2	T	M.i.	Avg	Max	Over-	Min	Avg	Max	Z.	Avg	Max	MIn.	Avg	Max	In Avg	Mex	1 2	Avg	X X		
Regional	gold-uranium-base metal	<u>د</u>	20	35	42	-	0	45	-	5	ž	300K	1	ı	I	0.2	2 10	80 0	35	တ	0	Ú	0		
	phosphate Marine evaporite-potash	0 51	10	30	30	2.5	9 01	12	15%	Şχ	1000K	1000K	1.1	I	1 1	-1	e	II ₉	1.1	1 1	II	1 (II		
	4 Continental sedimentary- coal 5 Stratform innegue	12	20	33	35	ю	10	4.	15%	100	140	500	1	ı		ю	8 10	- 1	1	ı	1	ı	1		
	complex		-	1	×	53	153	362	195	200	40K	100K	-	ı	ı	9	18 42		1	1	1	1	ı		
Stage 2: Detailed Reconnaissance	gold-uranium-base metal			35	44	-	30	180	е	5	4	200	1	1	1	0.2	2 2	24 (0 0.5		0	0	0		
	phosphate 3. Marine evaporite-potash	0 15	10	9 %	50	æ m	21	4 6	15%	500	¥ 4	ž x	+ 1	1		~ 1	9	4	1 1	1 1	1 1	1-1	1.1		
	Continental sedimentary- coal Stattom (2000)	20	23	28	59	ю	6	12	15%	650	0	140	1	1	1	2	φ	о О	-	1	I	1	1		
	complex				×	319	209	1075	372	1	ı	1	10K	20K	50K	12	27 9	- 06	-	1	I	1	1		
Detailed Surface Investigation of	gold-uranium-base metal		- 50	35	45	15	110	430	12	0.3	2	7	200	ž	7	-	7 2	20	-	-	0	4	12		
	phosphate 3 Marine evaporite-potash	0 15	50	10	35	e 0	60	24	9	200	5 0	200	2.5K	7 6K 8K	13. 13. 15.	7 9	2 2 1	4 6	9 16	20	36	4 60	100		
	coal 5 Stratiform igneous	0	10	45	45	20	160	275	15%	25	ۍ.	0,2	640	ž	*	6	12	18	1	İ	6	4	φ		
	complex	1		1	×	1172	2355	5744	1005	10	20	20	10K	3. X	25K	91	24 4	1 48	9	12	-	ဇ	9		
Detailed Three- Dimensional	Detailed Three- gold-uranium-base gold-uranium-base metal metal metal Americal Sampling 2 Manna cadmantage.	0	10	40	50	285	1800	7400	180	03	2	7	200	¥	4 4	16 5	2 09	7 87	19	35	12	24	72		
of Target Area	phosphate 3. Marine evaporite potash	0 0	0 0	38	90	260	1191	4295	55 15%	200	12 500	200	25 X	7.6K	35 35	12 3	30 6	60 24 18	24	1 %	24	24	100		
	Continental sedimentary coal	0	10	45	45	25	40	09	15%	1		1	Ϋ́,	ş	25K	9	12 2	24							
	complex	i	1		×	2810	4735	7654	1435	4	10	20 5	2560	δ Α Α	13K	24 3	36 4	48	on 	92	е	е	18+		
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Table C.3 (Cont'd)

Table C.4 Summary Mineral Exploitation Statistics for Stratabound Discrete Mineral Occurrence Types

Additional Comments Plus Delays Due Solely to Avg May 1 1 2 -1.1 + 1.19 0 1 2 32 1 2 90 12150 Regulation 112 11111 2 m 1 0 1 1 20 1 -2 9 2 Duration (Months) of Each Stage Š 118 1 | 4 | 0 +++++0 -10 100 Mex 30 | 3 5 | 5 11111 11211 9 | 9 18111 Plus Non-Regulatory Delays Min Ava 2 I + I + Iε | 2 1 9 1 1 10111 - | 4 } 11111 - 10 11011 +- | | | -10 24 6 62 Ž 12 7 14 14 28 8 9 8 - 4 5 21 8 13 8 9 12 12 25 10 9 24 14 36 Without Any Delays Min Ava 15 3 35 35 0 5 4 c 36 5 e 5 5 24 2 2 2 9 0 2 2 5 6 35 4 12 5 - 5 5 75 7 7 6 6 2 9 2 9 12 12 Area (Acres) Under Claim, Option, Š 1 : 009 **№** 00K 60K 26K 5 X ¥ 4 ¥ 9 9 9 + + + + +Lesse, Etc. Ava 200K 9 4 4 7 7 7 20 7.64 7.54 300 Ē 3 2 X 8 1 | 200 50K \$ X X \ \frac{2}{2} \ \text{S} I + I + I + I\$ \$ 25K 900 t φ ; <u>\$</u> × e¥ 100 004 40 17 20 60 60 Area (Sq. Mt.) Being Investigated 00 04 ¥ \$ \$ \$ \$ ₹ 5 **4** \$ 8 \$ 8 \$ 500 X Ava š ¥3. 30 12 12 15 9 10 25 5 \$ \(\) \(\ ¥ 4 5 01 6 6 0 0 E **₹** ₹ **±** ¥ Ē ¥, ž 80 8 27% 15% 15% 10 7 욋 33 20% ا60° 15° 14 د 15% 15% 15% 13 95 Over 0,0 °° 000 Direct Cost (\$000) of Each Activity or Method, Excluding Overhead 51 | 28 28 28 150 Ř 250 12 680 700 48 980 244 19 781 130 40 850 50 360 72 101 140 75 95 98 22K 137 800 125 6 286 Ava œ 29 18 18 95 20 6 5K 21 23 230 122 18 369 65 20 1100 475 25 160 20 59 75 46 50 37 350 9 6 6 6 7 Ē 110 22 2 100 300 150 8 50 60 11 25 25 10 175 5 80 40 20 17 25 21 ۰ 1 98 9 × 7 0 0 0 0 0 0 0 1 1 09 9 $\times\begin{array}{c} 4 & 6 & 6 \\ 4 & 6 & 6 \end{array}$ --65 75 9 $\times & & & 33 \\ \times & & & 04 \\ \times & & & 05 \\ \end{array}$ Percentage of Each Activity Done by × 8 5 30 × £ 2 8 9 ¥ $\times 85$ 30 30 30 40 30 × 30 × 33 33 40 40 1 5 5 1 01 8 s 10 17 17 30 30 50 155 0 1 7 4 8 9 3 9 5 0 5 5 25 14 30 50 0 7 0 1 8 9 0 0 119 0 1 8 ~ 0 0 109 0 0400 ص سے ہے ۔۔ 4 Fossi laterie
5 Shale Hosted massive
sulfide copper
6 Shale Hosted massive
sulfide Pb Zn Ag
7 Carb Shrat Ba, F
8 Carb Shrat Ba, F
9 Volc Mass Sulfide
10 Metamorphic sulfide copper 6 Shale Hosted massive sulfide Pb.Zn-Ag 7 Carb Strat Ba. F 8 Carb Strat Pb.Zn-Cu 9 Votc Mass Sulfide sulfide-Pb-Zn-Ag
7 Carb Strat -Ba F
8 Carb Strat -Pb Zn Cu
9 Volc Mass Sulfide
10 Metamorphic Main Activities and Methods, in Chronological Sequence oil and gas Continental sedimentary 2 Continental sedimentar Fossil latente Shale Hosted massive sulfide-copper Shale Hosted massive 5 Shale Hosted massive 3 Lacustrine evaporite 4 Fossil laterite Lacustrine evaporite Lacustrine evaporite oil and gas 2 Continental sedimen . Marine sedimentary oil and gas uranıum uranıum uranıum Stage 3: Detailed Surface Investigation of Target Area Detailed Reconnaissance Regional Appraisal

Sheet 1 of 2

Table C.4 (Cont'd)

	Main Activities and	<u>,</u>	ď	ercentage	•		Direct	Direct Cost (\$000)	8		(IN 63) earl	Í		(100)	1			Duration (Months) of Each Stage	MON U	o (sub	Each	ege s		-		_
	Methods, in Chronological Sequence	سز کی ۔	ō ▼ Ճ	of Each Activity Done by			of Each Method	of Each Activity or Method, Excluding Overhead	50 H	`	Being investigated	2	D L D	r Claim, Op Lease, Etc.	Under Claim, Option, Lease, Etc.		Without Any Delays	È	4 E	Plus Non- Regulatory Delays		Plus Due S Reg	Plus Delays Due Solely to Regulation	. 0	Additional Comments	
		<u>_</u>	s -		<u>-</u> ا	Z.	Avg	- Max	Over-	Min.	Avg	Max	Æ.	Avg _	Max	ž	PAV	X X	Min		Max	Min ,	Avg h	Max		
Stage 4: Detailed Three-	Marine sedimentary- oil and gas		<u> </u>		1		ξ	20K	20	10	- 20	500	 X	24K	128K	-	ဗ	9	1	1	-1	- 1		- 1		
Dimensional Diversal Sempling	2 Continental sedimentary	_									_	q	7					í	,	•				-		
of Target Area	e	, 0	0	9 3	2 0	55	340	- t		A 4	± .2	. 80	ξ ζ	, % %	§ §	၁ ၈	36	2 / 2	ا ر	ا ع	2	20	02.9	90		
	4. Fossil latenite	_									თ	40						9	n	12	30			20.		
	sulfide-copper		-	5 20	75	24	231	999	10%	1	1	1	100		, X	9	17	04	ı)	1	2	o	-81		
	6. Shale Hosted massive		_			_						, ,			_			5	7		C			9		
	7 Carb Strat Ba F	4						4 '				9	200		¥ ¥	9 9		24	† ?		ဥ ဖ			2 4 0		
	8 Carb StratPb.Zn-Cu 9. Volc. Mass Sulfide 10. Metamorphic		0 0 0	35 0 35 40 40	55 55	¥ 5 24	13.9K 7 27.5 10.5	203 203 203 203 203	38.	e 6 +	2 2 7			4 X 4 0			29 15 12	160 36	ை 1	% I I	8 I I	5 0 c	5 6 4	24		
Stage 5:	1 Marine sedimentary-	-	-	-	-	-	1_			1	_	_			_					t				_		1
Development	oil and gas	1	-	-	1	555	5.3K	3.£	29	4	15	90	- 3 K	4.5K	16K	4	4	39	2	9	6	0		2		
	2. Continental sedimentary	_	_				è					_												_		
	uranium 3 Lacustrine evanorite			× 1	1 1		ا څ		1	- 5	4			, S	¥		(ı	ı	ı	ŀ			1		
	4 Fossillaterite						280K	ñ	_			9	- 9K	m	12 BK			20	е	ا ا	1 2	9	1 12			
	5. Shale Hosted massive	_		-							_													_		
	6. Shale Hosted massive	_		- -	-	_	1	İ	1	1	ı	1	1	-	[1	ı	(1	1	ı	ı	1	1		
	suffide-Pb-Zn-Ag	-		_	_					0 25				×					ı					7		
	7 Carb Strat Ba F				_						01		200		X .			06	4			9		48		
	9 Volc. Mass Suffide	, 0	0 0	4 0 4 8	25	7007	200	020/	ر د د	۱		2 1		4 V 1		. I	24		27	S 1	0 4 1		2 I	9 1		
	10. Metamorphic	_	-	-			1	1	1	1	ı	1		F	1	1		1	1	_	ı	_	_	_		
Stage 6:	1 Marine sedimentary																							_		
Production	Oil and gas	I		1	l	1	I		I	- 5	_	52	÷ ξ	4 X	- 16 K	}	1		ı	1	ı	1		1		
	uranium	1	- 1				:		I	O.	4	00		20K	100K		1	1	1	ı	ı	1	- 11	1		
	3 Lacustrine evaporite	1		_	-	1	1	1	II	ı		J				I	1	1	1	-	1	ļ	ı	-		
	4. Fossil laterite		IN	ις.			1			1	I	}	95	3.8%	12.8K		1	ı	ļ	1	1	1		ı		
	suffide-Copper		0	50	- 6	1	1		ı	- (-	1	1	١	1	t	1	1	ŀ	1	-[1	1	- 1		
	6. Shale Hosted massive																									
	Sulfide-Pb-Zn-Ag	_					1	1	1	ı		I	1	1	ı	1	I	1	1	1	l	ļ	1	ı		
	8 Carb Strat. Pb.Zn-Cu			45	45	1 1	1 1	1 1	1 1	1 ``	^		-		0		٠.,	1 00	1 1	1 1	1 1		1 1	1 1		
	9 Volc. Mass Sulfide	-			_		1	1	1	<u> </u>						_			ı	1	ļ	1	1	-		
	10 Metamorphic						1	1	1	-	}	1	1	1	ì	1	1	1	1	ı	1	1	1	1		
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Table C.5 Summary Mineral Exploitation Statis Discordant Mineral Occurrence Types

	Main Activities and	<u>-</u>	٩	en and and	١.	_	1	08) 190	É	-			-			-		3	150	DUISION (MONINS) OF EACH SIBUS	5 15	Jane				Г
	Methods, in Chronological Sequence	ш. р. –	۵ ¥ ه	of Each Activity Done by	1		of Eacl Method	of Each Activity or Method, Excluding Overhead	y or ding		Area (Sq. Mi.) Being Investigated	q. Mi.) ng gated	5	Area (Acres) Under Claim, Option, Lease, Etc.	Area (Acres) er Claim, Opt Lease, Etc.	fon,	Witho	Without Any Delays		Plus Non- Regulatory Delays	. کر خ		Plus Delays Due Solely to Regulation	ays ly to lon	Additional	
		<u></u>	s	2	- -	<u>.</u> 	Avg	¥e	Over	2	Avg	×eW	-	Min A	Avg	×	Min	Avg Max	ž.	Avg	¥ ×	ž	Avg	ž		
Stage 1: Regional Appraisal	1 Breccia pipes 2 Porphyry copper 3 Bageanc sulfur 4 Ven-replacement 5 Mass sulf pipes. Base 8 Precous metals 6 Matic ultramatic 7 Anorthosite complexes 8 Ven-ultramatic 9 Ven-doomite 10 Carbonatite alikalic		× + 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	× 1 0 30 30 30 1 0 10 10 10 10 10 10 10 10 10 10 10 1	× × 60 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	10 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	101 6 6 8 8 38 8 20 20 7 7	76 191 191 191 195 195 195 195 195	25°°°5°°5°°5°°5°°5°°5°°5°°5°°5°°5°°5°°5°	144 00 00 00 00 00 00 00 00 00 00 00 00 0	2		200 20 20 20 20 20 20 20 20 20 20 20 20			0 -	15 15 15 15 15 15 15 15 15 15 15 15 15 1	34 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	1 1 0 0 0 1			0 0 +	02			
Stage 2: Detailed Reconnaissance	1 Breccia pipes 2 Porthyry copper 3 Bogenic sulfur 4 Venireplacement 5 Mass sulf pipes. Base & Precious metals 6 Malic ultramatic 7 Anorthosite complexes 8 Venirultramatic 9 Venirultramatic 10 Carbonatte alkalic	4	× + 16	× + 5 25 25 30 30 30 30 30 30 30 30 30 30 30 30 30	× × 060	135 135 8 8 2 2 20 20 16 16 16	368 368 21 11 113 113 429 22 22 24 24 24 27	30 8822 482 27 27 278 578 128 400 400 160	25°°° 318 3 5°° 7 5°°° 19 11 25°° 7	1000 1000 200 200 200 200 200 200 200 20	500 102 103 103 103 103 103 103 103 103 103 103	5	Y Y Y Y Y		 	- 12K	005 12 12 12 12 12 12 12 12 12 12 12 12 12	30 30 30 30 30 30 30 30 30 30 30 30 30 3	1011 0:10:11	6 2	N : 1 1 : 1	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 2 6 1	1 9 1 1 8 1		
Stage 3: Detailed Surface Investigation of Target Area	1 Breccia pipes 2 Porphyry copper 3 Bogene sulfur 4 Venr-eplacement 5 Mass sulf pipes. Base 8 Precous metals 6 Matic-utrametor 7 Anorthorste complexes 8 Venr-dtoanatic 9 Venr-dtoanatic 10 Carbonatite alikalic	N N	× 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	× + + + + + + + + + + + + + + + + + + +	× × 66 × × 60 × × × 60 × × × 60 × × × 60	592 3 3 5 8 8 8 8 65 7	935 17 25 41 20 30 65 7	30 1284 72 72 60 350 50 70 70 16	2 4 425 2 5° 5° 5° 5° 5° 5° 5° 5° 5° 5° 5° 5° 5°	0 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	6 4 4 5 1 6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	£ .	3 1 1			12 8K 20K 1 0K 5K 5K 30K 10K 500 30K	2 24 24 26 26 27 20 20 3 7 20 2 10 2 10 2 10 6 15 6 15 6 15 6 15 6 15 6 15 6 15 6	18 19 19 19 19 19 19 19 19 19 19 19 19 19	1 1 1 2 1 1 1	5 - 1 - 7 - 1	24 24 24 12 1	1-00 000+10	24 02 4 1 1 6	54 12+ 12+ 72 10 46+ 28		
Stage 4: Direction Three- Directional Physical Sampling of Target Area	1 Brecca pipes 2 Porphyry copper 3 Bogenc sulfur 4 Vern-replacement 5 Mass sulf pipes 6 Maric ultramatic 7 Anorthorsite complexes 8 Vern-ultramatic 9 Vern dolomite 10 Carbonatire alkalic		1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 1 40 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	1 × 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2810 31 2800 76 170 213 23 193	4735 131 131 131 1549 1763 1928 68 68 68 68	17000 7654 1554 1554 16624 1883 1488 1488 1488 1488	6 1 1435 6 1 1435 7 15°, 3 30 7 25°, 3 30 8 1 1 8 31	3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	005 44 40 6 6 8 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	2002 12 2002 12 12 12 12 12 12 12 12 12 12 12 12 12				2 2 2 3 3 2 2 2 3 3 3 3 3 3 3 3 3 3 3 3	23 36 33 36 33 36 30 42 4 20 4 20 56	6 6 6 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7		1 6 1 7 2 1 1 2 1 1	18 0 0 18 1	w o o o o o o o o o o o o o o o o o o	η κ η α 0ν - α , φ	18 + 48 + 48 + 48 + 50 + 50 + 50 + 50 + 50 + 50 + 50 + 5		

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Table C.5 (Cont'd)

Stage 5: 1 Breccus prpes Development 2 Porphyry copper 3 Brogenic sulfur 4 Venir-replacement 5 Mass sulf prpes 1 Base 8 Precious metals 6 Matruttamatic 7 Anorthosite complexes 9 Veni-utitramatic 7 Anorthosite complexes 9 Veni-utitramatic 7 Base 8 Precious metals 6 Matruttamatic 7 Anorthosite complexes 9 Veni-utitramatic 7 Base 8 Veni-utitramatic 7 Base 8 Veni-utitramatic 7 Base 8 Veni-utitramatic 7 Base 9 Veni-utitramatic 7 Base 9 Veni-utitramatic 9 Veni-utitramat		of Eac			of Each Activity or	Activity	ê ê	₹	Area (Sq. Mi.)	ĵ.	₹	Area (Acres)	•			-	And the fact that the fact tha		•		T		_
1 Breccus press 2 Porphyry copper 3 Bogenic sulfur 5 Mass sulf prees: Base & Precious metals 6 Malculfamaric 7 Anorhosite complexes 8 Ven. uttramaric		Activity Done by	à à		Method, Excluding Overhead	hod, Excludi Overhead	2	<u>.</u>	Being Investigated	3	P J	Under Claim, Option, Lease, Etc.	ptlon,	ž o	Without Any Delays		Regulatory Delays	<u>.</u>	2 8 8	Due Solely to Regulation		Additional Comments	
1 Breccia pipes 2 Porphyry copper 3 Bageinc sulfur 4 Ven-replacement 5 Mass sulf pipes Base & Precious metals 6 Mafic uttramafic 7 Anorthosite complexes 8 Ven-uttramafic	_	s	2	Min	Avg	×	Over-	Z.	Avg	Mex	Ē	Avg	X X	ž.	Avg	Mex	Min Avg	Mex	Ē	Am	Mex		
5 Mass suft pipes. Base & Precious metals 6 Matic-utramatic 7 Anorthosite complexes 8 Vein-utramatic	1100	1105	1 1 7 2 45 45	3.5 3.5 5.1 1.5 5.5	1 1 Š	9.2 5.1 1.5 5.4	1 1 %	0.5	1 10	e 8	640	1 1	8 1 1 ×	24	1 1 + 2	98118	1 1 1 2	1 6	1119	1 1 2	I I I g		
6 Matic-unramatic 7 Anorthosite complexes 8. Vein-ultramatic	1				1	1	1	ı	ı	ı	1	ı	1	-									
	000	000	5 6 6		^	1 1 A	25%		1 []	1	1 1 1		1 1 1	1 1 2	118	1 1 2		H	ΙIα	118	ا ا رَّ		
9. Vein-dolomite 10. Carbonatite-alkalic	000		9 05			1.1	1 1		1 1	1 1	1 (1-1	1 1						11		<u>.</u>		
1 Brecca pipes 2 Porphyry copper 3 Bogenic sulfur 4 Venir replacement 5 Mass sulf pipes 6 Matc. Urfarmatic 6 Matc. Urfarmatic 9 Venir dolomite 10 Carbonatite alkalic	1111 111101	1111 111181	1111 1116	1111 111101													<u> </u>						

Sheet 1 of 3

Option, Without Any Requistory Due Solely to Comments itc.	×	2 6 12	10 12	1 2 4 2 4 6	6 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		6 10 18 2 4 12 0 6	4 12 24 0 0 0 6	4 12 24 0 % 0 6 6		2 0 0	6 15 40 0 2 12 0 6	25600 4 12 36 0 2 4 12	2 6 12 0 2 4	6 12 36 0 2 6 4 12	6 12 36 0 2 6 4 18	
Area (Acres) Under Claim, Option, Lease, Etc.	Min Avg				-					_		-	3840 7680				
	Ě	100K	100K	20.X	20K			100	100	20	100	_	04	æ	200		
Area (Sq. Ml.) Being Investigated	Avg	ş	20K	×,	ž			04	40	20	40		12	77	980		
A E	Z.	ž	ž	ž	100			10	10	9	ō		9	2	20		
<u>-</u>	Over-	20%	20%	20%	30%		25%	20%	10%	30°6	30%	27°s	10%	10%	20°t	15%	
ct Cost 8000 ach Activity is nod. Excludit Overhead	×	150	100	9	200	80	590	100	40	800	80	1020	14001	200	160	360	
Direct Cost \$000) of Each Activity or Method, Excluding Overhead	Avg	99	90	40	70	40	200	40	20	150	04	250	(200)	80	80	160	
	2	15	20	10	30	5	85	20	ç	20	0,	60	(40)	04	04	98	
		82	98	ၜ	99	92		7.5	7.5	99	09		20	85	985	Ц	
of the ch	3	9	5	50	25	52		20	50	52	25		20	'n			
of Each Activity Done by	S	φ.	ď	0	S	40		4	4	10	9		50	5	ď		
	-	0	0	0	5	3	[_	-	-	5	9		10	5	5		
و ہر ہے ۔		0	0	0	<u>-</u>	0	\Box	L	U L	L	0		ш	٥ د	ш.		
Main Activities and Methods, in Chronological Sequence		Geological Compilation	Photogeological studies (rock units weathering)	Land use compilation	Field inspections of several selected areas	Compilation and evaluation	Total	Geological mapping	Soil geochemistry	Drilling and sampling	Compilation and evaluation of data	Total	(Land acquisition)	Preliminary Feasibility study	Preliminary Environmental studies (eco. legal Political)	Total	

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Form 1 Summary Mineral Exploitation Statistics for a Specific Mineral Occurrence Type

Geologic Environment: Surficial Aluminous Clays & Laterites Typical Ores: Kaolinite & Bauxite for U.S. of America

	Main Activities and	<u>.</u>	_	Percentage	.00	_	ō	Direct Cost (\$000)	(\$000)	_	•	•			:			1	Uration	Duration (Months) of Each Stage	a to (au	acu on			_		_
	Methods, in Chronological Sequence	r. β ¬		of Each Activity Done by	ક્કે		ōğ	of Each Activity or Method, Excluding Overhead	tivity or tcluding		=	Being Investigated	<u> </u>	Under (Under Claim, Option, Lease, Etc.	option.	ž -	Without Any Delays	<u>.</u>	Plus Non- Regulator	Plus Non- Regulatory		Plus Delays Due Solely to Requisition	elays lely to		Additional	
			-	s	. ≥	-	<u>c</u>	Avg	× gW	Over-	₹	βvΑ	ž	Ē	Avg	Mex	# u	δvΑ	×	Min		×	Min Avg	¥			
Stage 4: Detailed Three-	Detailed Drilling and assaying	и	-	4	20	7.5	700	1500	3000	3℃%	е	12	40	1920	384C	12.8K	9	12	24	2	6	12	5 6	12			
Physical Sampling	Physical Sampling Metallurgical Testing	ш	-	4	20	75	100	200	400	10%	9	12	40				e	12	24	0	2	4					
	Reserve calculation	0	'n	01	25	09	20	40	99	10%	9	12	40				-	2	4	0	2						
	Environmental Studies	IL.	-	4	50	75	100	400	1000	20%	9	12	40				12	12	12	0	2	· ·	2 6	12			
	Preliminary Mine Planning	0	-	4	20	7.5	20	04	98	10%	9	12	40				2	4	9	0	2	e					
	Compilation of Data & Feasibility Study	0	-	4	20	75	20	100	200	10%	9	12	04				2	4	9	0	-						
	(Land Acquisition)	L	'n	0	25	99	(300)	(2K)	(4K)	10%	9	12	40				12	12	12	0	9	12	9				
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Stage 5:	Mine Construction	ш	-	7	2	- 26	20K	50K	100K	10%	-	2	9				24	36	09	9	12 24	12	36	_			
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Sheet 3 of 3

Geologic Environment: Surficial Aluminous Clays & Laterites Typical Ores: Kaolinite & Bauxite for U.S. of America

Additional								
Add								
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Main Activities and Methods, in Chronological Sequence								
		Stage 6: Production						

Geologic Environment: Surficial — Laterites Tronical Ores: Nickel

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Declated perchemical Fig. 18 F	Stage 3: Detailed Surface	Detailed geologic mapping of target areas	u.			×	12				20	100	150	1	ı					_					
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Marie plant construction 20 125 150 15	Stage 4:	Drilling, logging				×		_	_	0	10	2.0	2.5	2K	3K	9K		1	-	-	-	1	Ľ.		-
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	Stage 6: Production				H	H															H		H		
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Geologic Environment: Surficial — Stream Placers Typical Ores: Gold, Tin, Silver, Diamonds

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	Main Activities and	ó	Percentage	1000		Direct	Direct Cost (\$000)	ĝ	_	(N 25) 2274		• • • • • • • • • • • • • • • • • • • •	1		Duratio	Duration (Months) of Each Stage	n Stage	
	Methods, in Chronological Sequence	۳. ۶ ¬	of Each Activity Done by	£.≩à		of Eac. Method	of Each Activity or Method, Excluding Overhead	<u>פ</u>		Being Investigated		der Claim, Op Lease, Etc.	Area (Acres) Under Claim, Option, Lease, Etc.		Without Any Delays	Plus Non- Regulatory	Plus Delays Due Solely to Beculetion	Additional
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		$\frac{1}{1}$	- 1	- -	-	- 1		- 1	-						- 1	•		
stage 1: Regional Appraisal	1 Hegional appraisal mainly literature to locate largest areas of alluvium-first	history	history							to	No irmit other							The greatest time consumer could be 3, i.e. picking up land.
	<u>.</u>	O dliw £	х	х		-	2	- in-	- 2	£ö	than Size · · ·	see pelow	-	o.E.	3 mos			,
	2. Locate most favored areas from study of	19(6)					_				of denosit	_						
	source rocks.	oya to	×	х		-	5	chaded		-								
	tain land position-who	ool eu	uiuiw į															
	portion of it is available	O	×	×		-	ď	Ė										
	Total	<u> </u> -	 	1	+	- m	15	cluded		_	_	_	_	_	_	_	_	
Stage 2: Detailed Reconnaissance	This stage would probably be omitted unless the taking of a few widely spaced large samples from natural exposures in cliff faces in	<u> </u>							Gener Russia allowe.	Generally speaking, large Russia for two reasons 11 allowed to disrupt ground I really think one can forge preservation of the status	g, large or sons: 1)11 ground an forget:	ompanies nsufficien about any to of the 6	are no long it dollars in tuture maji mvironmen	per interesti the ground, or placer op t resulting fi	ed in placer and: 2) Uni erations in rom pressu	*Generally speaking, large companies are no longer interested in placers other than perhaps tin in Malaysia an stassa for wiseasons. I insufficient dollars in the ground, and, 2) Unlikelihood of being environmentally allowed to disrupt ground. **I really think one can lorget about any future major placer operations in view of the politician's attitude toward preservation of the status quo of the environment resulting from pressure from vociferous, well organized.	Generally speaking, large companies are no longer interested in placers other than perhaps tin in Malaysia and in Russa for two reasons. I insufficient dollars in the ground, and, 2) Unlikelihood of being environmentally allowed to disrupt ground I really think one can lorger about any future major placer operations in view of the politician's attitude toward preservation of the status quo of the environment resulting from pressure from vociferous, well organized.	
	streams incised in the alluvium can be regarded as detailed reconnaissance								So. unl	intelligent, but ignorant minority groups So, unless the above comments are not form is wasted and is costing us dollars.	orant mind we comm tis costin	onty group ents are r g us dolla	os noted and a rs.	ction taken	by Politicial	ns, then the time tak	infeligent, but gnorant minority groups. So unless then the time taken in completing this form is wasted and a comments are noted and action taken by Politicians, then the time taken in completing this form is wasted and so comments and always.	
Stage 3: Detailed Surface	As described under stage 2: detailed	<u> </u>	<u> </u>				_		- 2		-							At the end of this stage is would know whether to
Investigation of Target Area	reconnaissance Total	х <u>ц</u>	×	x	4 4	4 4	42	\perp	<u></u>	+	+	+	1	\pm	1	+		proceed or get out.
Stage 4: Detailed Three- Dimensional Physical Sampling of Target Area	Stage 4: Ording with chum-type Ording and grid pattern Dimensional Initially the grid lines could Dispital Sampling be as much as 'sto mile of Target Area Soot 1000 it apart This difficulture with and you'd be closed	L	×	*	120		1000		1 to 10									At the end of this state, assuming success, we would be considering the cost of a dredge & a dredging operation.
	Total	\dashv	_	-	120	0	1000									_		
Development	built since the 50s other than by the Russians who incidentally had sert over one of California's Yoba Dredges on which their present dredges are no)		A dredge from \$10 To recorr cost clos	A dredge today would cost any where from \$10 million. To recommission an old one would cost close to \$10 million.	kd cost au iSO million okd one v	n. where		As previously	y stated, r	t would as doing this	s would be	wen if a dre	dging opers	NOTE. As prevously stated, it would appear that even if a dredging operation finally cleared the environment the time and costs involved in doing this would be considerable and very few companies will be game to try	NOTE. As previously stated, it would appear that even it a dredging operation finally cleared the environmentalists. The time and costs involved in doing this would be considerable and very few companies will be game to try	
9 45 43	doubt patterned.		x	×	+	+	\downarrow		A mediur	n-sized gold	dredge v	vould shift	t approxima	ately 8,000	to 12.000	yards in a 24-hour p	A medium-sized gold dredge would shift approximately 8,000 to 12,000 yards in a 24-hour period, which is about	
Production					<u>.</u>				With a gr.	200 UoU yards to a 3.0 day month. With a grade of 1 100.02 Au. cubic yard which is higher tha nonthly ources of gold recovered would be 3.000, which at anothly our \$5.040.000 per annum We might net 15% of this.	30-day in 20 oz Au 31d recovi 10 per anr	cubic yar cubic yar ered woul	d, which is id be 3,000 night net 15	higher than I, which at a 5% of this	average by	200 000 yatos for a 30-day month. With a guide 20 yate month, and the second of 2 the average py possibly a factor of 2, the average monthly pance of 190 do covered would be 3,000, which at a gold price of \$140. ounce = \$420,000 gross monthly ounce of \$0.00 be annum. We might net 15% of this.	abor both yades for a so-bar month. Job down, a coulder yard, which is higher than average by possibly a factor of 2, the average monthly puncted of gold recovered would be 3,000, which at a gold price of \$1.40, ounce = \$420,000 gross per monthly ounce of \$6.40,000 per annum. We might net 15% of this.	
		\dashv	4						MO7E: IL	n Alaska, c	r elsewr	ere whe	e permatr	ost exists,	the dredg	NOTE: In Alaska, or elsewhere where permatrost exists, the dredging year is 180 days.	ys.	

Geologic Environment: Surficial — Coastal Placers Typical Ores: Titanium (Ilmenite)

_ EDL	Summary Mineral Exploitation Statistics	for a Specific Mineral Occurrence Type	

	Main Activities and	<u></u>	•	Percentage	•		5	Direct Cost (\$000)	(\$000								_		uration	Month	Duration (Months) of Each Stage	ch Stag		-	
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Appraisal	Field Inspection	ш		33	33	34	9	9	vo.	5%		4		0	0	0		5	-	- 5			0		
	Wide-spread surface sampling of dark sands along roads, etc	ш		33	33	4.	ري د	vs.	٠	5%		*		0	0	0		8		- 5			0		, swell opera
	Totai	<u>. </u>	<u>-</u>	1	<u>' </u>	<u> </u>	ŀω	20	25 5	5%								9	+	∞ 	_	0	0	 º]	
Stage 2: Detailed Reconnaissance	Surface sampling in areas of free access at say 400 intervals	! 		83	33	 			<u> </u>			ž		0	0	0		4		 4	<u> </u>	l	1	I	
	Land work determination of ownership, etc.	0	25	55	25	52		01	•	2%		¥		0	0	0		φ		φ			0		
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Stage 3:	(Land Acquisition)	0	52	52	25 2	55	(2)	(15)	(30)	5°و	-	ō.	25	640	6.4K	25K	4	20	24	<u> </u>	<u> </u>	l	c		
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	Plotting, drafting	0			20 2	20	-0	-	-							5 X	-	-	-	_		0	0	0	mits i Syes lengi
	Total					1	2	12	8	5%							80	24	04	- o	œ 	7	ო	4	
Stage 4:	Chum drilling at 400"	u.			50 5	- 20	9	89	400	5%	-	5	10	640	6.4K	- 54	2	20	90	2	1	4	φ	24	
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Stage 5: Development	Construction					 (§	ro 	_	25					3.2K	6.4K	ž	01	2	24	5 5		c	е.	Œ	
-																									
Stage 6: Production																									

Geologic Environment: Surficial — Residual Deposits Typical Ores: Phosphate

- Előt	Summary Mineral Exploitation Statistics	for a Specific Mineral Occurrence Type	-
	Summary Mine	for a Specific 1	

	Main Activities and	0	•	Percentage		-	ةً	nct Cost	0008	-						-		2	S S	Duration (Months) of Each Stade	of Each	Stage	_	-		
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Stage 1: Regional Appraisal	Geologic appraisal. regional area selection	0		0,	8	 @	2	o c	15	2	, Yo	100K	1000K				2	ε 4								
	Air-photo, topographic and geologic map studies of selection	0						- σ	5	2	, ž	100K	1000K				~ ~	6. 4								
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Stage 2: Detailed	Geochemical and or soil surveys			10	30	. 09	- 51	25	45	ω.	0	ž	- Yo	X,	* * *	ž	2 - 3	9								
	Geologic reconnaissance mapping	la.					15	25	0 4	-	ő	,	¥ —	× ×	¥ X	¥	~~~	9						-		
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Stage 3: Detailed Surface	Detailed geologic mapping	iL.		0	30	09	- 01	25	35	-5	ε	9	12 6	009	¥.	æ ¥	-	3				1	- 1	1		
of Target Area	Detailed geochem and or soil survey	щ						30	04	9	ю	8	12 6	009	¥	ž	-	2				1	1	1		
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Stage 4: Detailed Three-	Overburden grid drilling	ш			35 6	, 99	40	70	150	10	3	- 5	12 60	. 009	ž	8K	- °	8 18	-	9	10		9	20		
Physical Sampling of Target Area	Physical Sampling Deep trenching or shaft of Target Area sinking	L.			35	65	2 0	- 09	150	12								5 15	-	2	5		ю	15		
	Engineering and economic feasibility studies	0					10	20	40	4								5 10		1	1	4	1	i		
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Geologic Environment: Surficial — Brines in Evaporites

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Form 1 Summary Mineral Exploitation Statistics for a Specific Mineral Occurrence Type

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Geologic Environment: Stratabound Extensive-Bedded Precambrian Typical Ores: Gold or Uranium or Base Metals

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Stage 1: Regional Appraisal	Study of geological litera- ture & maps. Selection of geologically economically. & politically favorable target regions.					09	2	Ф	2	ю		100K	1000k					'n	9						
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Geologic Environment: Stratabound Extensive-Marine Evaporite Typical Ores: Potash

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	Choice of basin to be investigated	0	- 5	25 3	30	30	9	10	20	15%	ž	4 7	*				٠ 4 2	J		ž		ď Z			
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Sheet 2 of 2

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Fig. 10 Comments of the co			<u>-</u>	_	s	3	J	Ē	A A	×	OVer	- -	A A	¥ W	1	-				l	<u> </u>	Awa	l _		-		
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Wexco Aprox 800p 2) Executive Summary and Supplement-Environmental Analysis Record Spring 1976 Profest in Industrial Minerals and Rocks, 4th Ed. S. J. Lefond Editor, pp. 963-990 3) Adams, S. S. 1975, Potash in Industrial Minerals and Rocks, 4th Ed. S. J. Lefond Editor, pp. 963-990												NOTE	F. Refere. 1) Preli	nce to a u minany R	definitive Regional b	n Study c Environn	of Potasi nental A.	i Mininç nalysıs	in the (Record	J.S. car. Oct. 19	l behad 175 Pd	Tby: Stash Le	asing	ii Sout	heast	<u>š</u>	
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Geologic Environment: Stratabound Extensive-Continental Sedimentary Typical Ores: Coal

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	Main Activities and	o u	۵.	Percentage of Fact	•6e1		٠ ٦	Direct Cost (\$000)	st (\$000	-	ž	Area (Sq. Mi.)	Î	~	Area (Acres)	Î			2 2	Curation (Months) of Each Stage	9	5	9180		1	
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Investigation	initial drilling and mappin-	u	0	5	54	45	15	150	250	15%							ю	4	9	1	ı	1	ю	4	9	
15 TE TE TE TE TE TE TE TE TE TE TE TE TE	Preliminary evaluation	0	5	115	30	20	5	0	52																	
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Stage 5: Development	Development drilling	u	0	<u>.</u> º	54	45	× ×	4 ¥	, ex	150	1			5K	10K	25K	12	24	36	9	0	0	9	5	24	
	Apply for permits, federal, state, county, municipal		0	01	4 د	45	9:0	F	9	15%	1	ı	ı				1	ı	1	ı	1	1	}	1	1	
	Environmental impact statement	0	0	0	20	20		:			10	2°	S				12	24	36	9	,	00		₹ Z		
	Engineering feasibility study	0	0 (01	5	45	50	7.5	ô	15%	ı	I	I				φ	12	18		· 6	φ		ă A		***cited as 5 to 10% total capital cost.
	Transportation study	0)	9	45	45	09	100	ĝ	15%	1	ı	ı				ო	9	12		ო	ဖ				
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	Total capital cost of mine preparation, including facilities						20K	55 X	YO m								1			İ						
	Total			-			22K	59K	86K	1.5.							12	24	36	7	%	30	پ	ot.	24	

Sheet 1 of 2

	Main Activities and Methods, in Chrological	5 L 6	ă.	Percentage of Each		_	5 6 2	of Each Activity or	of Each Activity or		Ā	Area (Sq. MI.) Being		Ar	Area (Acres) Under Claim, Option,	ps) Option,	_ _	Without Any	5 2	Plus	Any Plus Non- Plus Non-	- E	Plus Delays	* <u>•</u>		-
	Sequence	<u> </u>		Activity Done by	اج ج		š	thod. Exclu			Ē ļ	Investigated	8	5	Lesse, Etc.	ن		Delays		e e	Regulatory Delays		Due Solely to Regulation	aly to	Additional	፩ ፮
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Appraisal	Geologic Data Compilation	0				*	4	ř.	15	۲							-	04	9							
۵.	Prospector Submittals	0 "					5	77		7							U- C	-	5							
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9	Geologic Reconn	u.					4	7	54	4						_		4	ıç.							
⋖	Aeromagnetic Survey	щ O					8	100	250	00								ဖ	12							
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	Land Acquisition										100	200	ž	ý	20K	50K										
											In U.S.	In U.S. this size area di to acquire by claiming	In U.S. this size area difficult to acquire by claiming	ficult												
<u> </u>	Total	\vdash		<u> </u>	 -	<u>1</u> 	53	Fig.	36.2	6.		_					q	1:	;		+	+	+			
Stage 2: G	Geologic Mapping					-	-	28	42	28				_			9	89	12	-	_	_				
ssance	Geophysical Surveys Airmag						50	90	100	9							m	9	12							
<u></u>	EM iP						20	100	200	100							9	12	24							
<u>J</u>	Ground Magnetics						50	36	7.2	36							œ	5	24							
<u> </u>	Geochem Survey						7		21	-							5	ю	9							
4.0	Drilling for Geochem Stratigraphic Data						200	350	200	115							6	Ģ	12							
<u> </u>	Data Compilation Go-No Go Decision						=	32	140	32							ю.	ŋ	04							
<u> </u>	Land Acquisition													10K	ž.	25K										
F	Total		$ \cdot $	H	\vdash		319	209	1075	372						L	12	27	96		+	-				

Sheet 2 of 2

Form 1 Summary Mineral Exploitation Statistics for a Specific Mineral Occurrence Type

Additional Comments ž 18+ Plus Delays Due Solely to eg 9 č 12 Ave က ന Ē 0 2 ო | ž φ ∞ 2 9 Plus Non-Regulatory Delays Avg 4 9 4 9 6 Ę 3 ž (*) 48 C) ო 9 n 15 9 9 24 24 9 Ξ Without Any Delays 2 24 12 12 48 Avg 00 C ო e 54 e n 2 2 -9 <u>x</u> 8 36 Ē 2 24 12 9 2 ~ 9 m Area (Acres) Under Ctaim, Option, Lease, Etc. **Ka** 25K 38 64.0 P V 15K Ē š ž Area (Sq. Mi.) Being Investigated 000 20 Avg 20 10 Ē 20 4 63 200 900 20 1435 28 Ξ 35 650 200 1005 900 20 20 Direct Cost (\$000) of Each Activity or Method, Excluding Overhead š 900 5/44 21 3300 21 100 -63 20 100 84 100 7654 42 5K ž Geologic Environment: Stratabound Extensive-Stratiform Igneous Complex Tynical Orac Iron Chromium Platinum, Nickel 20 200 909 20 4 70 4735 28 Ξ 35 63 11172 | 2355 ٩٨d × ¥ χ 100 25 4 500 2810 50 51 200 25 Ē 55 21 ۰ Percentage of Each Activity Done by ž s ال الم يمان 0 0 4 40 4 0 шO 0 С Main Activities and Methods, in Chrological Sequence Geophysical D M Logging Geophysical D H Logging Prelim Metallurgical Tests Petrographic Mineralogic Geologic Compilation Reserve Computation Prelim Envir Impact Geochemical Survey Envir Impact Study Geologic Mapping Prelim Feasibility Drilling - Logging EM IP Surveys amond Drilling Plant Site Invest easibility Study Core Analysis Shaft Sinking Met Testing lotai Total Stage 4: Detailed Three-Dimensional Physical Sampling of Target Areas Stage 3: Detailed Surface Investigation of Target Area

oţ Sheet

Geologic Environment: Stratabound Discrete-Marine Sedimentary Typical Ores: Oil & Gas Play (Lower 48) Estmated 5 year cycle for Phase I through IV Exploratory Prase

	Main Activities and	_	Percent		_	Direct (Direct Cost (\$000)	<u>ا</u>	_			_					Uration	IIIOM)	8) OI E	Duration (Months) of Each Stage				
		ه س	of Each Activity	E >		of Each Method	of Each Activity or Method, Excluding	b 2	< ⁻	Area (Sq. Ml.) Being Investigated	<u> </u>	Under	Area (Acres) Under Claim, Option,	option.	¥,	Without Any	, <u>,</u>	Plus Non- Regulatory	Non-	۵ ۵	Plus Delays Due Solely to	ly to	Addi	Additional
			Done t			ð	Overhead							, [_	Delays	+	Delays	9,8	<u>-1</u>	Regulation	ğ	E C	ments
		-	s	S	¥	Avg	×	head	Ē	Avg	×	ž	δΑ	×	Ē	Avg	Max	¥	Avg Max	ž ×	Ā	ž		
Stage 1: Regional Appraisal	Stages Assessment of 1 Basin potential Mgt recommends entry (l ".	See Corrin	ment	4 001	A Staff	200	22	ž	ž,	Ž	See comment No. 2	mment		-	9	12	2	NONE	<u> </u>	NONE		1 No good wa	1 No good way to estimate
deta collections	2 Literature search	0	2			B.Data	5														_		percentage of e	percentage of each act- ivity by others
	3. Accumulate published data, log files, reports, etc.	0			10		§ ———																Generally no land holdings at this phase	o land this phase
	4 Assemble regional reports, maps cross-sections.	0																						
	5 Regional field trips	LL.																						
	Total	! !		 	110	350	909								-	9	1.2	0	+	<u> </u>	0	L		
Stage 2: Detailed	1 Exploration team assigned	0			300	A Staff	2000	ů.	ž	Ř.					12	36	09	- 1	Cles	Clearance Clearance Clearance 1.2	1 1.2	· ·	1. Incipient stage of acre-	age of acre-
Reconnaissance Proprietory data	2 Seismic operations	ш				B Data														-			age acquisition	tion
collecting and prospect genera-	3 Field geology	LL				Collection	<u>s</u> —																د Field operation restric-	ion restric-
tion	4 Data purchase	0			ž	ž	20K																ted in some areas to summer months.	areas to nths.
	5 Begin interpretation of data	0																						
	6 Lab studies of samples, etc	نـ																						
	7 Maps and prospects generated	0																						
	8 Recommend land purchase	0																						
	Total	 			¥.	6 5K	22K								12	36	Ź	-	2 6	0	2	9		
	_	_	-		_	_			_	_			_	•	_	_	_	_	_	_	_			

of 2

Geologic Environment: Stratabound Discrete-Marine Sedimentary Typical Ores: Oil & Gas Play (lower 48) Estimated 20 years development and production

Stages Stages The general and acquisition F = 75% F = 75% Petal seismic and geological as needed	יי סיי סיי	-	A Activity Done by	500 (1K)	II II ar an O	of Each Activity or Method, Excluding Overhead Overhead Asiath Asiath Asiath Charles (Control of Control or 444 or 44	i P	Area (Sq Bein Investig	* 。		Area (Acrea) Under Claim, Option, Lease, Etc. Min Avg Max Sox 200K 1.5M	Acres) In Option, J. Etc. In Max	<u> </u>	Without Any Delays	Max 60 Max	M	dus Normal Avg Avg Fee L Avg Avg Avg Avg Avg Avg Avg Avg	Max Max nds e e e e e e e e e e e e e e e e e e e	Plu Due	Solety So	1 1 2	Additional Comments Comments Acquisition land on prospects	
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1 Scoop & Design 2 Roads & Locations 3 Production Facilities 4 Devipmt Dinling 5 Flow Lines	0 11 11 11 11				5 5	<u>й</u> й	50 3 300 6 500 15 0000 40 100 3		- Sa Sa Sa			 	i		1 2 2 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1	e e	2 7 3 0 0 1	1 4 2 9		1 0 0	1 1 1 - 1 -	2 2 1	Neporting for a Major Operator
1. Contract Sale 2. Pipeline Connection 3. Unitzation 1. Injection Injection 5. injection	0 11 0 0 11				2 2 2 2	E 7 E 50	6 00 30	°	\$\ \text{\$\tilde{S}\ \$\t		25 126	Same Same		¥9-	0 - 0	2 3 6 6 3	1 - 2 - 5	1 0 0 0 4	m 4 m •	0 0 0 0 1	- 0 - 0	e - I	Peporting for a Major Operator

Geological Environment: Stratabound Discrete-Continental Sedimentary (Sandstone) Typical Ores: Uraninite, Coffinite (Open Pit)

Sheet 1 of 2

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	Methods, in Chronological Sequence	j u ' 8 →		of Each Activity Done by	3	_	2 9 3 10 10 10 10 10 10 10 10 10 10 10 10 10	of Each Activity or Method, Excluding	oding of		Are ave	Area (Sq. Mi.) Being Investigated		Are. Under C Lea	Area (Acres) Under Claim, Option, Lease, Etc.	offon.	¥ity o	Without Any Delays	-	Plus Non- Regulatory	Non- atory	-	Plus S	Plus Delays Due Solely to		Additional	
		1	-	S	. 2	+	N N	Avo	\vdash	-		Ava	ž		Ava	ž	9	574	3	Min Ava		ž		A w A	į		
Stage 1:	1 Select Basin	0	+	131	+	+	+	+	+-	Dead 01	3	3	\dagger	┰	0	+	+	-	+	_	_	+-	_	+-	0		
Regional Appraisal	2 Literature Exam	0		Ţ.	100	- 5	25	25	20	ų,	- s	estern U.S		0	0	0	53	4	ıç.	0	0	0	-				
	3 Field check for proper host rock, alteration & possible mineralization	u.		100	9	2	25	1 20	001	9	4	ž	ž,	0	0	0	m,	9	12	-	2			0	0		
	Total					H	75 1:	125 2	250	25				П			9	15	24	-	5	Б	\vdash				
Stage 2: Detailed Reconnaissance	1 Subsurface study of an area by use of gamma & electric logs. map major paleo drainage	0		24	100	~	25	92	09	w.	×	4	, A	0	0	0	ю	9	on.	0	0	0	0	0	0		
	2 Conduct regional geo- physical programs	ш			100	100		350 6	009	02	×	4	ž	0	0	0	9	- 2	24	-	2	п	-	2	г		
	3 Select best areas from above activities plus what land is available. Best geological prospect not always available.	0			001		25	25	20	φ.	ž	×	*	0	0	0	81	4	¢	0	-		0	-	27		
	Total					1.5	150 4	400	00.2	80	-		\vdash				6	15	3	1	3	5		3 €	9		
Stage 3: Detailed Surface Investigation of Target Area	1 Examination of area for surface showings of host rock, alteration & mineralization	LL.		34	100	2	25	50 1	81	01	4	ž.	Xo.	0	0	0	m	9	12		2	3	0	0	0		
	2 Check land for previous activity & possible staking by competitors	0 LL		<u>=</u> _	100		52	25	8	ى ب	200	ž	×	0	0	0		7	m		-	~					
	3 Local geophysical program	Le.			00		52	- 1	100	01	200	400	009	?	0	٥	70	φ	<u> </u>	0		- 2	0		2		
	4 Possible radiometrics geochemical or radori programs	ı.	<u> </u>	<u> </u>	100	10	3	350 6	009	70	×	4	*	0	0	0	9	- 2	54	-	2	· · ·		8	e		
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Geologic Environment: Stratabound Discrete-Continental Sedimentary (Sandsione) Typical Ores: Uraninite, Coffinite (Open Pit)

Sheet 2 of 2

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Geologic Environment: Stratabound Discrete-Lacustrine Evaporite

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			Stage 1: Regional Appraisal		Stage 2: Detailed Reconnaissance				Stage 4:	Dimensional	of Target Area					

Geologic Environment: Stratabound Discrete-Fossil +ypical Ores: Kaolinite & Bauxite for U.S. of A.

Form 1	rites Summary Mineral Exploitation Statistics	Towns Constitute Managed Constitution Constitution
	Clays & Laterite	

Sheet 1 of 3

Sheet 2 of 3

Geologic Environment: Stratabound Discrete-Fossil Aluminous Clays & Laterites Typical Ores: Kaolinite & Bauxite for U.S. of A.

Form 1	Summary Mineral Exploitation Statistics	for a Specific Mineral Occurrence Type
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Sheet 3 of 3

Geologic Environment: Stratabound Discrete-Fossil Aluminous Clays & Laterites Summary Mir Typical Ores: Kaolinite & Bauxite for U.S. of A.

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Sheet 1 of 2

Geologic Environment: Stratabound Discrete-Shale Hosted Massive Sulfides

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Geologic Environment: Stratabound Discrete-Shale Hosted Massive Sulfides Summary Typical Ores: Copper-Lead-Zinc-Silver

Form 1 Summary Mineral Exploitation Statistics for a Specific Mineral Occurrence Type

Sheet 2 of 2

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Sheet of 2

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Sheet 2 of 2

Form 1 Summary Mineral Exploitation Statistics for a Specific Mineral Occurrence Type

Geologic Environment: Stratabound Discrete-Shale Hosted Massive Sulfides Typical Ores: Lead-Zinc-Silver

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o.	س کی		ш			٥	ų.	0	u.	íL.	0	0			<u>L.</u>	u.			
Main Activities and	Methods, in Chronological Sequence		Drilling-logging	Assayıng	Metallurgical studies	Amenability studies	Hydrology	Order of magnitude studies	Environmental studies	Shaft sinking for bulk samples	Budget estimate	Definitive est	Total	Underground Mine	Mine planning & develop- ment of drifts, cross cuts raises, shafts	Plant Construction	Total		
			Stage 4:	Dimensional	Physical Sampling of Target Area									Stage 5:	Developing the control of the contro				

Sheet of 2

	Main Activities and	0,	۵	Percentage	•	_	ں	Direct Cost (\$000)	st (\$000)	_		,	_	_ '	:	_		-	OUTBIO	UOM) U	Duration (months) or Each Stage	Each :	Stage		٦	
	Methods, in Chrological Sequence	س کی		of Each Activity Done by	ક્કે	_	· 3	of Each Activity or Method, Excluding Overhead	ctivity of xcluding		₹ =	Ares (Sq. Mi) Being Investigated		Under L	Area (Acres) Under Claim, Option, Lease, Etc.	Option. c.	*	Without Any Delays	<u></u>	2 g Q	Plus Non- Regulatory Delays		Plus Reg	Plus Delays Due Solety to Regulation		Additional Comments
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Stage 1: Regional* Appraisal (1) & (2)	Compilation (includes structure, stratigraphy, geophysics, geochemistry) Literature imagery																			 			<u> </u>	-	 	
	Map: 1" = 80 m. 1" = 8 m. 1" = 4 m.	0	5	15	98	20	9	~	10		7.5K	10K	75.	1	ſ	1	9	6	12	• • • • • • • • • • • • • • • • • • •	Because semilar retals.	e of sim to expi	ntar orig itoration ie of the	in, explo for cart flower u	oration for conate ho	Because of similar orgin, exploration for barite. fluorite is similar to exploration for carbonate hosted base metals. Because of the lower unit value & the somewhat
	Survey oil-water well cuttings (2)		9	50	35	35	-	е	5							1	0	е	φ	OLE E	reater (arealex le exper y less]	ctent of nditures The "ha	barite 1 s and the ilo occu	fuorite oc e amount urrence tt	greater areal extent of barite. fluorite occurrences, the allowable expenditures and the amount of driling (to feet) is usually less. The "halo" occurrence that is often observed.
	Regional drainage sedi- ment-onentation (1)	ıι	ۍ	01	50	99	2	ď	20	15%				- 1	1	ļ	-	е	9	1 % 2 0	an distri- ase me ance ar	or scale stals hat reas Su	s been milady.	used to . peripher	fe around locate de ral scout	on district scale—barrier fuorite around agove or below base metals has been used to locate detailed reconnais sance areas Smilady, perpheral scout drilling for base metals material base facts to the program to the property.
	Prospect exam-familizan- zation mapping (1)	ш	15	20	 %	35	-	ю	νΩ						1	ļ	-	б	9							encodeo en en
	Total				_		6	18	28	15°a							7	10	14				\vdash	+	Γ	
Stage 2: Detailed	Compilation geology geo- chemistry, geophysics	0	5	15	30	50	2	4	9		100	200	400				-	2	6							(taking of property po-
(1) & (2)	Field mapping	ш	10	50	35	35	7	4	9	15%							-	ო	е	-						sition some- times defer-
	Drainage sediment surveys	ш	25	5	50	99	2	e	00									5	ю							red to next stage follow- ing some
	Evaluation	0	0,	50	35	35	9	7	<u>о</u>	-							-	-	-							types of geophysical
	Total			_			11	18	19	15%							-	9	3		\vdash			-		surveys)
Stage 3: Detailed Surface Investigation of Target Area	Geophysics EM-bante & fluorite (for stratigraphic & structural mapping) (1)	- u	s.	10	30	55	2	ю	4	15°°	5	6	17		1	1	90	-	2	1	1		1	ı		
	Gravity barite (1) & (2)	L	2	2	45	45	5	10	20	15°°	5	6	17	ı	1	ı	5	n	4	1		1		-	-	
	Target selection (1) (claim stake) (100cl.)	ш	25	25	25	25	(20)	(20)	(40)	15%	2	6	17	2K	2 K	4 X	-	5	2	90	0.5	0.5	-	'		
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	Geochem soil sampling (1) & (2)	щ	01	30	8	30	2	4	· ·	15%	5	6	17				90	-	5			-	-	1	1	
	Environmental base line study (1) & (2)	0 14	0	10	5	45	Ą.	90	100	15%	5	6	17	2K	×	,		2	В	-	2	2	1	<u> </u>	1	
	Dozer trenching (1)	L.	25	35	98	38	9	<u></u>	10		_	_				_	_	-	_	-	1	1	- 6	-	- 21	

Geologic Environment: Stratabound Discrete-Carbonate Stratiform Typical Ores: Barite-Fluorite
Note: (1) Wm. U.S. (2) Mid-continent

Sheet 2 ∘ 2

	Main Activities and	3	•	Percentage		-	6	0	Direct Cost (\$000)	-			-						Paration	Duration (Months) of Each Stage	io (su	Each	9087		-	
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Stage 4: Detailed Three-	Drilling (1) & (2) 1,000 ft ctrs	Щ	0	50	04	04	150	300	909		5		17				η η	9	12	-	<u> </u>	-	1	-	2	
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Sheet 1 of 2

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Stage 1: Regional Appraisal	Compliation includes structure stratigraphy geophysics spectreministry in residue imagery Map 1 = 80 m in the structure in th	0	151	·	e e	90	ହ .	1.	ō		۲- ۳ ۲	, to	ر بر	;			Œ	<u>a</u>	57			'	!	1		
	Survey of water well cutings		•	ο _ζ ,	35	35	-	m	40						:		0	~)	9		1				*Mostly applicable only	cable only
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	Prospect examifamilian zation mapping	lu.	ō.	- 02	98	35	-	m	40	-							-	m	٠		i	<u> </u>		- 1		
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Stage 2: Detailed	Compilation geology geochemistry geophys	٥		- 	98	99	2	7	9		001	200	400			1			1	1		<u> </u>	- 1			
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Stage 3: Detailed Surface	Geochem soil sampling*	ايد ا				30	4	æ :	ō ,		9	10	20	ž.	×.	12K	(P)	æ	12	1	i	Ŀ			"Mostly Watm U.S	s n u
of Target Area	Geophys, mapping IP EM; Photogrammetry base		o.	2	8	υς 	-	Τ;	e .								7)	s.	Ď.	1	ī	<u></u>	i	1		
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	Environmental studies baseline data	4	٥	- ⁵	45	45	5	30	99								5	54	12	i			-	1	Max fig Wrn U.S	Su
	Total	E	t	H	\vdash	\vdash	1.7	94	7.5	15°c	T			L	L		1.5	12	-21	H	\vdash		-	L		

. Geologic Environment: Stratabound Discrete-Carbonate Stratiform Typical Ores: Lead-Zinc-Copper - Wrn. U.S. - Midcontinent

Form 1 Summary Mineral Exploitation Statistics for a Specific Mineral Occurrence Type

Sheet 1 of 3

	Main Activities and	<u>-</u>	•	Dercentena	1		ٔ ا	1	Direct Cost (\$000)										Durat) W	nths)	Duration (Months) of Each Stage	Stage				
	Methods, in Chrological Sequence	п. р –	•	of Each Activity Done by	£ à			Each Over	of Each Activity or Method, Excluding Overhead	5 8 P	₹ =	Area (Sq. Mi.) Being Investigated		onder L	Area (Acres) Under Claim, Option Lease, Etc.	res) Option, ic.	*	Without Any Delays	, An	<u> </u>	Plus Non- Regulatory Dalaus	ح نـ	3 2 4	Plus Delays Due Solely to Renulation	2.25	Additional Comments	
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Stage 4:	Drill 1,000' ctrs.	u	0	20	6	45	Ţ.,	4 ZR	∠ Ø 3		ກ	`	ÿ	¥.	4.0 X	9.00 X	=	<u>.</u>	52	27	1.2	24	9	9	. 5		
Dimensional	*Drill 50' ctrs.	u.	0	0	45	45	1 9K	9 6K	° n	15%							50	58	160	9	24	36	φ	9	.2		
Physical Sampling	Physical Sampling Assays analyses	٦.	0	%	0	04	25	61	25								. 1	1	1	1	ı	1	ı	1	1		
	Dozer work	ш	×.	35	50	20	25	6	- 25								I	Say Say Say	in Win U.S. of Infling gettiss can be shallow— say 400 1 000 feet but drining costs are night say rotal 550.0 th in microntinent drilling begins now average 2000 feet but costs.	drilling drilling 0000 fer 30 ft Ir average 1, \$12	depths of build midcor pe 2000 \$15 ft	scan be infling c ntinent	shallov osts are drilling	—	1 .		
	Total	.		T	1	 `	3.05K	18	38 Ag 34	15%						_	21	59	160		36	[6	12	12	54		
Stage 5:	Permit applics.	0	01	30	30	30	-	1	ı		9	2	15	- 8 X	4.5K	9.6K	12	24	36	24	30	40	12	20	36		
Development	Feasibility studies	0	0	10	45	45					ю	7	15	, ¥	4 X	9 6K											
	Plant/ operations design	0	0	20	0	04					ю	7	15	1.9K	4.5K	9.6 Y9.6		_									
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	Drifting \$150 It	ш	0	10	45	45	100	300	900		ю	7	15	1.9K	4.5K	9.6K											
	Undergd. drilling \$25. ft	u.	0	0	45	45	90	150	300		ю	7	15	- 4 X	4.5K	9.6K											
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Stage 6:	Plant√mill constr.	ш	0	10	45	45					ε	7	15	1.9K	4 5K	9.6K	10	25	100								
roduction	Receipt of final Federal- State-county permits	0		· · ·						15%	e	7	15	1.9K	4.5K	¥9 6	yrs		yrs								
	Operations	ш									ю	7	15	7	4.5K	9 6K											
	Total		\Box							15%							5	25	100								

Geologic Environment: Stratabound Discrete-Volcanogenic Massive Sulfides Tvoical Ores: Cu-Pb-Zn-Au-An

	Main Activities and	ó	7		,						`	Area (54. MI.)	2	_	Area (Acres)	•				The Real Property lies and the least lies and the l					
	Methods, In Chronological Sequence	ר. פיח		of Each Activity Done by	£ ጵ ል		• 1€	of Each Activity or Method, Excluding Overhead	ach Activity nod, Excludi Overhead	5 E		Being Investigated	De te	5	Under Claim, Option, Lease, Etc.	option. Itc.		Without Any Delays	- k	Plus Non- Regulatory Delava	Non- atory	~ ~ ~	Plus Delays Due Solely to Reculation	ys y to	Additional Comments
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Stage 1: Regional	Selection of volcanic belts	0		¥	0	0.4	- 2	10	07		χοί	100K	1000K	_			-	2	η,						
Appraisai	Geof Reconn and selection of volcanic units	ш					5	30	20	L	ž	Ş	100£				(*)	ø	9						
	Airborne geophysics	LL.					20	909	980	c	100	200	ž				2	φ	Ē						
	lotai	‡	\vdash	†	T	 	40	9.2	150	7		_	-	_				41	87	_	_	₽		<u> </u>	
Stage 2: Detailed	Geologic mapping & sampling	La.		30	30		- 21	- Q	80	- oc	001	500	400					9	0-						
neconnaissance	Geochemical survey	ų.					01	52	99	ĸ	100	200	004		ı	-	C)	s.	100						
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Stage 3:	(Land Acquisition)	ш		æ	30	ç,	10,	(30)	1091	4)	1		<u> </u>	1 5K	¥	š	67	tr.	15	1	_		4		
Investigation of Target Area	Detailed mapping.	li.					01	20	35	প	10	25	9				^	4	2020		1	i	4	30	
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Stage 4: Detailed Three- Dimensional	Testing geological geophysical targets by drilling	lμ		0	rc.	5.	25	50	92	ч	7	ut:		1.5K	4	Ş	е	ر.	01	ı		1	- 0	9	
of Target Area	Detailed drilling	u.					20	100	200	ц	2	an .	9				4		12	1			1	4	
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	Sinking of exploration shaft or drilling for bulk samples	lu.		-	 26	70	20	100	200	មា		-	7	ž		ž	φ.	12	24				ç	24	
	Engineering & economic teasibility	0					10	20	40	2															
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Stage 5: Development					30	70	_																		
	Total				T	Г			L	L	L	L				L	L			H	L	L			

Geologic Environment: Stratabound Discrete-Metamorphics Typical Ores: Graphite, garnet, kyanite

	Main Activities and	0.0	•	ercentage	8	-	a ·	Direct Cost (\$000)	(\$000)	-	1	Arm (So. MI.)	<u> </u>	4	Area (Acres)	-'		Ď	it ja	Duration (Months) of Each Stage) of E4	ch Sta	8			
	Chrological Sequence	. p -		or Each Activity Done by	á 4 3		ð \$	of Each Activity or Method, Excluding Overhead	rwty or cluding		<u> </u>	Being Investigated		Under Claim, Option, Lease, Etc.	er Claim, Op Lease, Etc.	- ig	¥ Ā	Without Any Delays		Plus Non- Regulatory Delays	\$ \$ 5 =		Plus Delays Due Solely to Regulation	alys ely to tion	Additional	
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Stage 1: Regional Appraisal	Geologic study of favorable metamorphic regions	0		20	04	0	2	S	01		ž	70 3	, 50X	,	1		-	2 3	1	. 1				1		1
	Selection of most likely areas and field checking	ш					2		25	2	ž	¥,	ž 		1	1	-	ۍ د		<u> </u>	<u> </u>	1	1	1		
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Stage 2: Detailed Reconnaiseance	Small-scale geologic appraisal, sampling	ш		20	04	01	0	20	04	4	2009	× ×	Ř.				2	4	- 2	1	1	0	-	m		
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Stage 3: Detailed Surface	Detailed geologic map- ping, structural studies	ıτ		99	6	9	0	50	30	4	₄ ,	5	15 51	500	π	ž,	2	ε ε	2	1		٥	-	9		1
Target Areas	Trenching & detailed sampling	ů.					01	15	25	n		4	10				2	ۍ د		<u> </u>	- 1	0	-	5		
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Stage 4: Detailed Three-	Detailed trenching and dniling	u		99	6	0	15	50 10	001	ۍ	-	2	4 E	300	200	¥,	4	6 10				٥	7	•	I	1
Dimensional Physical Sampling of Target Area	Physical Sampling Engineering feasibility of Target Area study	0		90	99	50	00	5	25	2							2	- 4								
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Geologic Environment: Discordant-Breccia Pipes
Summary Mineral Exploitation Statistics
Typical Ores: Copper, Lead, Zinc, Silver, Molybdenum, Uranium, Gold, Diamond for a Specific Mineral Occurrence Type

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		יוי פיי		of Each Activity Done by			M o u	of Each Activity or Method, Excluding Overhead	(audo) Wity or Juding		Area	Area (Sq. Mi.) Being Investigated		Area (Acres) Under Claim, Option, Lease, Etc.	Area (Acres) er Claim, Op/ Lease, Etc.	Dption.	\$	Without Any Delays		Plus Regu	Plus Non- Regulatory Deleve		Plus Delays Due Soiely to Requistion	ty to	Additional	
		<u> </u>	<u> </u>	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	-	<u>*</u>	Min	Avg		Overh	<u> </u>	Avg	×	Ē	Avg	X ×	Ē	o.∀	×	L L	Avg Max	Ī	Min Avg	ž		
Stage 1: Regional Appraisal	I Hegonal appraisal manly of iterature first country wide narrowed to state wide narrowed to specific areas in possibly several different geologic environments			x	×		φ		36		Millions of Square miles															
	2 Visits in field to selected areas in each state to narrow this down to one area. Total	<u> </u>		<u>^ I</u>	×		8 4	7 1	76 40	j	Each area investigated from a few sq miles to 100 sq miles	v sq mile	gated es to					- • • • * -	boubtift y indivic robably rith a his	Doubt if the regional apply individual prospecting probably move into a kind with a history of mining	Doubt if the regional appraisal would be done by individual prospecting. He would probably move into a known mining area with a history of mining.	He wor	uld be c	lone		
Stage 2: Detailed Reconnaissance	1 Selected area say of the order of 100 sq. miles or maybe several hunder defined mapped at a scale of 1 inch to 1 mile	LL.	-	×	×	x	- vo	-	<u> </u>	ļ <u> </u>	00		ž												At the end of this period we should have delineated the area of land to be applied for or staked	
	Total		1	+	+	+	2	1	30	+	<u> </u>	+	T				\perp		+	+	1	+	\perp	-		
Stage 3: Detailed Surface Investigation of Target Area	Land acquisition- staking, front money, etc.) 2 Detailed geologic	ж	×	×		×	(3)	(100) (1	(11K) (100) (11K) (gross) (possible)		-		20	640		12 8K	-		9							
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	4 Geochemistry Total	ц	+	×	^ ×	×		+	0 8		_	\top	20	640		12 8K			9 (\dashv	_	_				
Stage 4: Detailed Three- Dimensional	Drilling anywhere from 5,000 to 100,000 feet at sav \$15.1tm				+		4	- 4	9				1	640		12.8K	, ,				-				numbe	
Physical Sampling of Target Area						Ŧ	001	<u> </u>	200					10-20 acres	10-20 acres		,		<u>y</u>	<u></u>		··			on dependent er of drill rigs u f course resul	
	Total			\vdash	-	-	175	17.	1700	H							6		12		\vdash				sed	

Sheet 2 of 2

Geologic Environment: Discordant-Breccia Pipes
Typical Ores: Copper, Lead, Zinc, Silver, Molybdenum, Uranium, Gold, Diamond for a Specific Mineral Occurrence Type

Additional	Comments									
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Plus Delays Due Solely to	outeton.	Min Avg Max	No experience					_	T	Manmum of 1,000 tons per day, as much as 10,000 tons per day, as much as 50,000 tons per day, underground 50,000 tons per day underground for evalue = \$80 to \$1.50 per ton—much lower in case of open pit copper which could be as little as \$50 per ton We would expect to make 15% profit minimum.
Plu	•								Γ	th sowers as \$500 minus
Any Regulatory Due		Max	No experience							as muc
Plus Non- Regulatory	Delays	Min Avg	lo expe	£						Per day
	—I -	2	2 (_				L	Minimum of 1,000 lons per day, as much as 10,000 lons per day underground Soot olsons per day underground Ore value = \$60 to \$150 per ton—much lower open pit copper which could be as little as \$50 We would expect to make 1 \$% profit minimum
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Without Any Delays		Avg		cludes pist & ur	development		_			OOO to
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Area (Acres) Under Claim, Option, Lease, Etc.	-	Ē	640							
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Area (Sq. MI.) Being Investigated	-	Avg	_						t	
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Direct Cost (\$000) of Each Activity or Method, Excluding	ð	Avg								
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Main Activities and Methods, in Chronological	eouenbec		Shaft	Headframe	Hoist	Underground drifting	Total		Total	
			Stage 5: Development				•	Stage 6:		

Geologic Environment: Discordant-Porphyry Typical Ores: Copper, Molybdenum

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Geologic Environment: Discordant-Porphyry Tvoical Ores: Copper. Molvbdenum

Sheet 2 of 2

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Detailed Infer- Dimensional Physical Sampling	Mineralogical, Chemical, etc. Tests on Core				х		,	7	4							-	-	8							
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otage 1: Regional Appraisal	Study of geological litera- ture & maps, selection of geologically, economical ly & politically favorable target regions	0		01	30		2	9	12	e e	70T	100k	200				-	9						
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Stage 2: Detailed Reconnaissance	Study of geological litera- ture and maps, selection of specific target areas	0		0	. <u> </u>	9	<u> </u>	<u>-</u>	®	- ε	-	12 5	20				<u> </u>	9				<u>.</u> I	<u> </u>	
	Aenal photography, surface geologic study and sampling	LL.					9	. 3	30	9		12 5	90					12						
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Stage 3: Detailed Surface	Geologic mapping & sampling	ш		. <u>.</u> 	04	9	 ი	- o	27	Ф.	-	4	12 6	600	2 6K	š	<u>.</u> I	89				-	9	
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of Target Area	Compilation and study of data	0						- 21	40			4	2 66	600	ž	ž,		24						
	Feasibility study	0		• •	30	70 1	01	25 10	100									6 12						
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Stage 5: Development																								
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Stage 6: Production																								
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Geologic Environment: Discordant-Vein and Replacement Deposits Typical Ores: Silver-Copper

	Main Activities and	o.		Percentage	tage		۵	Direct Cost (\$000)	1 (\$000)	_	\$	(M 0)	-			-			uration	Duration (Months) of Each Stade	10 (8)	ach St	8			
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Stage 1: Regional	Study of records concerring old mining camps	_ 0	25	25	25	25	- v	12	20	5%	-	01	20	0	0	0	g.	12	09	0	0	0	0	0		
=	Logging old drill holes. if any	LL.	25	25	25	25	-	7	ç	ري د د	-	01	20	0	0	0		2	4	0	0	0		0		
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Investigation of	Surface trenching	ш	9	9	10	10	-	0	20	5°°	0	-	n					φ	24	-	רי	on .	9	12		
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	Deep penetration geophysics	LL	0	01	45	54	-	9	5	5%	0	-	е .				-	2	4			m	0	0	acquired 'ederal lands	erallands
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Staye U.; Production																		_		\vdash	-	-	_			

Sheet 1of 2

Geologic Environment: Discordant-Massive Sulphide Pipes Typical Ores: Copper, Zinc, Lead, Silver, Gold

	Main Activities and	ó	۵	Percentage	•6	_	ā	Direct Cost (\$000)	t (\$000)		*	(M co.	<u> </u>	_	(10104) 1014	•			Ouratio	L (MO	Ins) of	Duration (Months) of Each Stage	stage		7	
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Stage 1: Regional Appraisal	Field inspection of typical occurrences (possibly in other regions)	ш	5	- 51	30	20	0	~	25	25°.	5	-	ý		i	ı	I	0.5	12					,	,	
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	Photogeologic Study		0	40	30	99	5	52	200	25%	100	1000	50 K				9.0	ю	64	1	I	1	1	· 	_	
	Visual Airborne Survey (for color anomalies)	ш	50	- 0 - 0	35		2.0	2	0	25%	50	1000	30K	I	i	1	0 01	0.2	-	001	0.5	ო	1	<u>'</u>	man thes	many groups omit these steps
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Stage 2: Detailed Reconnaissance	Examination of known mineral prospects & submittals	la.	5	25	35	35	0.2	υ	99	25%	ŧ	01	100	20	ž	δ¥	. 0	0.5	4		0.5	4		0.2	-	
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Sheet 2 of 2

Form 1 Summary Mineral Exploitation Statistics for a Specific Mineral Occurrence Type

Geologic Environment: Discordant-Massive Sulphide Typical Ores: Copper, Zinc, Lead, Silver, Gold

	Main Activities and	<u>.</u>	ءَ	Percentage	•	-	ă	Direct Cost (\$000)	(\$000)	_		9	_		(100)			De	ration	Duration (Months) of Each Stage) of Ea	ch Sta			
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Geologic Environment: Discordant-Mafic-Ultramafic Typical Ores: Nickel-Copper, etc.

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	Total		-	-	\vdash	+-	2	- 9	- 2	e			-			-	-	3 6	_		 -	-	_			
Stage 2: Detailed Reconnaissance	Study of geological litera- ture and maps, selection of specific target areas	0		50	40 4		٣	6	81	М	u)	000	-				-	6 24								
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Geologic Environment: Discordant-Anorthosite Complexes Typical Ores: Iron, Vanadium, Titanium

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Geologic Environment: Discordant-Veins in Ultramafic Rocks Typical Ores: Asbestos, Talc

Form 1 Summary Mineral Exploitation Statistics for a Specific Mineral Occurrence Type

Sheet 2 of 2

Geologic Environment: Discordant-Veins in Metamorphosed Dolomite Tvoical Ores: Talc

Cummons Minoral Evaluation Statistics	Suffilliary Millerar Exploration Statistics for a Specific Mineral Occurrence Type	
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Sheet 2 of 2

Geologic Environment: Discordant-Carbonatite-Alkalic Complexes Typical Ores: Phosphate, Rare Earths, Columbium. etc.

Form 1 Summary Mineral Exploitation Statistics for a Specific Mineral Occurrence Type	
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