METAL MINING IN PERU SINCE THE DEPRESSION

Working paper for the book *Peru 1890-1978: Growth and Policy in an Open Economy*

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Introduction

This paper is one of a series designed to throw new light on the development of Peru's export economy by detailed analyses of the leading export sectors. Metals as a group have generally, since the Depression of the 1930's, accounted for around a third of Peru's exports, rising to half by the late 1960's. During this period[1] the sector has undergone a number of significant changes, described in detail in the body of the paper. The most important features to emerge may be summarised as follows:

1. The outstanding milestones of the past fifty years have been the collapse of copper in the 1930's, the development of iron in the early 1950's, and the reassertion of copper's dominance in the 1960's. All of these three events affected directly the large foreign firms in Peruvian mining - Cerro, ASARCO, Marcona, Southern Peru Copper. The history of foreign domination of the mining industry has been concentrated in the periods of leadership by copper and iron - that is, basically, the 1910's and 1920's on the one hand, and the late 1950's and 1960's on the other. The intervening years, from 1930 to the mid-1950's, were a period of partial vacuum so far as foreign enterprise was concerned, and the gap was filled by a rush of new Peruvian mining enterprises, reminiscent of that which occurred in the 1890's.

2. This process began with the establishment of dozens of new gold-mining companies in the first half of the 1930's, drawing capital from various other sectors of the economy, and

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(1) I have covered the main events of the pre-1930 period elsewhere; see 'Development Problems in an Export Economy: a Study of ... Peru, 1919-1930' (d. Phil., Oxford, 1974). Chapters 3 and 5.

with directorates filled with names from the capitalist elite of Lima. Gold became the leading mining product at the end of the 1930's. It was then replaced by lead and zinc, two strategic base metals whose production was largely in the hands of Peruvian and small foreign enterprises, as distinct from the foreign giants Cerro and ASARCO. The late 1930's produced a number of lead-zinc companies controlled by local capital, companies which formed the basis for several of the large individual fortunes of the 1950's and 1960's. The leading elements in Peruvian mining during the 1930's, 1940's and early 1950's, thus, were the small and medium-sized firms, mostly national, using the new 'intermediate technology' provided by the small flotation concentrator.

3. Among the new Peruvian ventures of the 1930's and 1940's were several which are interesting on the grounds of participation by families who had been prominent in mining around the turn of the century, but had since been eclipsed or displaced by the large foreign firms - the main examples were the Gallo, Rizo Patron, Fernandini, Pflucker, Proano and Boza families. Of equal significance, however, wasthe entry of a large section of the leading Lima and coastal capitalists into mining during this period, notable examples being the Beltran, Wiese, Aspillaga, Pardo, Lavalle, Ayulo and Berckemeyer families. From 1950 on many of these newly-established national companies were gradually incorporated into a network of interlocking directorates linking them to Cerro, but in almost all cases ownership and control remained in local hands, and the links to Cerro were for convenience, rather than a prelude to foreign takeover.

4. Although there has been no repeat of the mass sellout of national enterprises to foreign capital which occurred during the first two decases of the twentieth century, it is clear that the initiation of new development in mining by the Peruvian capitalist elite largely ceased after the early 1950's. Initiative and leadership (as indicated by the establishment of new enterprises and large-scale expansion programmes) passed to foreign firms, and to some extent to the Peruvian State (through the Banco Minero). Correspondingly, the native elite ceased to be entrepreneurs and became, increasingly, passengers on the foreign-capital bandwagon. The present government's attempts to reverse this process have involved the creation of a new, greatly-expanded State sector, rather than any revival of private domestic entrepreneurship.

5. While the milestones noted in (1) above all involved the large-scale sector (the sheer size of whose projects automatically attracts attention), much of the interest in a study of Peruvian mining lies in the small and medium-scale enterprises. It is here that many of the important trends developed, and here that one must look for enterprises which might have displayed the potential to grow into giant native alternatives to the foreign firms. With twenty years of activity behind them by the 1950's, the new generation of mining companies should have been capable of sustaining the forward momentum of the native private sector, moving on to larger scale, and adapting to modern technological development. Their abandonment of the field to foreign capital during the 1950's thus poses interesting questions. Perhaps the most important of these relates to Marcona, a mine whose capital costs should have been within the reach of Peruvian enterprise and which posed no great technological problem: a deposit

which had been in the hands of the State since the 1920's (and was therefore, in contrast to the large copper deposits, accessible to Peruvians); in retrospect, a case in which Peru seems clearly to have lost rather than gained from foreign control.

In the analysis which follows, the main task has been the assembling of basic data under various headings: mining in the economy; composition of mine output, balance between foreign and native control of production; regional impact of mining; case studies of gold, lead and zinc. The development of iron at Marcona and copper at Toquepala have not been covered here, on the grounds that these events have already received thorough basic discussion in other studies.(1)

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(1) See, e.g., Janet Ballantyne, 'The Gran Mineria in Peru, 1950-1970' (Title?) (PhD, Cornell, 1974); W.C.F. Purser, Metal Mining in Peru, Past and Present (London, 1971); S.J. Hunt, Foreign Investment in Peru under the Ancien Regime (mimeo, 1974); C.T. Goodsell, American Corporations and Peruvian Politics (Harvard, 1974).

Section A: Mining in the Economy

Metal mining in Peru is first and foremost an export-oriented activity, and Table A1 shows the proportion of total export earnings attributable to metals exports since 1925. Metals, it will be seen, accounted for around a quarter of exports in the late 1920's, rose to about a third in the early 1940's, and during the 1960's rose to about a half. This steady gain of mining relative to other export sectors (1) was broken, however, by two sharp reverses - the Depression of the early 1930's, which hit mining much more severely than other export sectors; and the period of the Bustamante government in the 1940's, characterised by controls and by rapid expansion of agricultural exports. In both these periods mining fell to less than 20% of total exports. Thus it can be seen that there have been three periods since the Depression when mining has played a leading role in export expansion: the late 1930's and early 1940's; the years around 1950 (the Odria period); and the early 1960's (Toquepala).

Table A2 (and Figure A1, which graphs the figures) shows clearly that these trends did not affect all metals equally. Copper was the main victim of the Depression, accounting for virtually all of the 15% drop in the share of metals between 1929 and 1932. From 1932 to 1940, mining exports picked up 25 percentage points (from 13% to the peak of 38%), of which copper accounted for only 12 percentage points, about half. The boom of the late 1930's was thus not merely a recovery by the copper industry; it was (more importantly) due in large part to the rise of other metals - particularly gold, lead, and zinc. In the 1940's copper slumped back again, falling below 10% of total exports by 1945 and showing no

sign of recovering again until the opening of Toquepala in 1960. The boom of mining exports in the late 1940's and early 1950's was dominated first by lead and zinc, joined later by iron. Peru in the 1950's, consequently, was first and foremost a lead-zinc producer, with copper and iron in subsidiary roles. Correspondingly, the companies and regions which specialised in these metals enjoyed a period of both absolute and relative prosperity. This picture of a changing balance among metals, producers and regions is developed further below.

Table A3 traces the role of the mining sector in the total economy. These figures suffer from several methodological and definitional problems,(1) but do serve to indicate general trends confirming the piecture already drawn on the basis of export figures. The share of metal mining in GDP increased considerably between the early 1930's and the early 1940's, reaching a peak in 1940-1942. Mining then fell back steadily through the reminder of the 1940's in relative terms, dropping below its 1935 share of GDP by 1945-1946, and reaching a low point in 1948. The establishment of the Odria regime marked a sharp turnaround in the fortunes of the industry, and recovery in 1949 was extremely dramatic (note that this abrupt recovery of mining's share in total product came before, not after, the new Mining Law of 1950 - a point which can be made also with respect to the share of metals in total

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1. These problems apply both to the series for value of the product of the sector, and to the totals used for GDP and national income. Briefly, for the period prior to 1950 the total value of metal-mining output has been used as a proxy for gross value-added in the sector, while from 1950 on the gross value-added given by the official mining statistics has been used. On the side of the GDP series, the three overlapping sets of estimates (Paulet/Ferrero for 1933-46; the Banco Central Renta Nacional series for 1942-58; and the Banco Central Cuentas Nacionales series for 1950-72) give widely-differing figures, with the result that percentages which use one of these sources as denominator cannot be readily compared with those using a different source.

Table A1

The Share of Metal-Mining Products in Total Peruvian Exports by Value

Year	Metal-mining exports, S/000	Total exports, S/million	Percentage share of metal-mining
1925	55,332	217,506	25.4
1926	61,185	239,758	25.5
1927	67,926	311,977	21.8
1928	78,167	315,188	24.8
1929	95,892	335,081	28.6
1930	75,452	235,985	32.0
1931	46,545	197,417	23.6
1932	23,998	178,529	13.4
1933	42,068	256,969	16.4
1934	51,890	305,094	17.0
1935	67,174	308,923	21.7
1936	73,412	335,812	21.9
1937	90,235	365,440	24.7
1938	112,972	342,129	33.0
1939	121,329	381,421	31.8
1940	156,370	405,813	38.5
1941	153,275	494,095	31.0
1942	157,292	494,962	31.8
1943	152,787	460,318	33.2
1944	156,653	547,336	28.6
1945	145,252	674,530	21.5
1946	166,965	983,583	17.0
1947	262,339	1,002,943	26.2
1948	258,493	1,055,833	24.5
1949	631,427	2,107,518	30.0
1950	717,912	2,886,761	24.9
1951	1,096,753	3,811,576	28.8
1952	1,179,032	3,686,479	32.0
1953	1,248,181	3,752,227	33.3
1954	1,681,459	4,792,102	35.1
1955	1,919,901	5,146,335	37.3
1956	2,288,192	5,917,262	38.7
1957	2,372,095	6,270,107	37.8
1958	2,517,419	6,512,621	36.9
1959	2,896,775	8,643,658	33.5
1960	5,337,923	11,799,224	45.2
1961	5,803,549	13,306,630	43.6
1962	5,291,297	14,478,460	36.5
1963	5,293,768	14,516,078	36.5
1964	7,194,535	17,888,668	40.2
1965	7,898,565	17,897,146	44.1
1966	9,771,798	20,500,114	47.7
1967	11,990,862	23,248,006	51.6
1968	17,112,790	33,516,301	51.1
1969	18,140,029	33,499,914	54.1
1970	19,434,476	40,549,072	47.9

Sources: Metal-mining exports drawn from annual volumes of Estadistica del Comercio Exterior, except for 1949-1950 (volume not available in Oxford) which is taken from Anuario Estadistico del Peru 1950, pp.440-442. There have been certain adjustments made to the original figures,

in order to maintain consistency. Throughout, the series include gold and silver bars, but exclude coined gold and silver and other manufactured and semi-manufactured forms of these two metals. As a result of these exclusions, the totals come out lower than those which appear in the official statistics for the 1920's and early 1930's. From 1934 through to 1948 the figures are simply the sum of the total for 'minerals: Metallurgical' plus the data on gold and silver bars from the final section of the arancel. From 1949 on, the figures are the totals as given in the annual table of 'metal content of mineral exports'.

FIGURE A II

PERCENTAGE COMPOSITION OF EXPORTS BY VALUE.

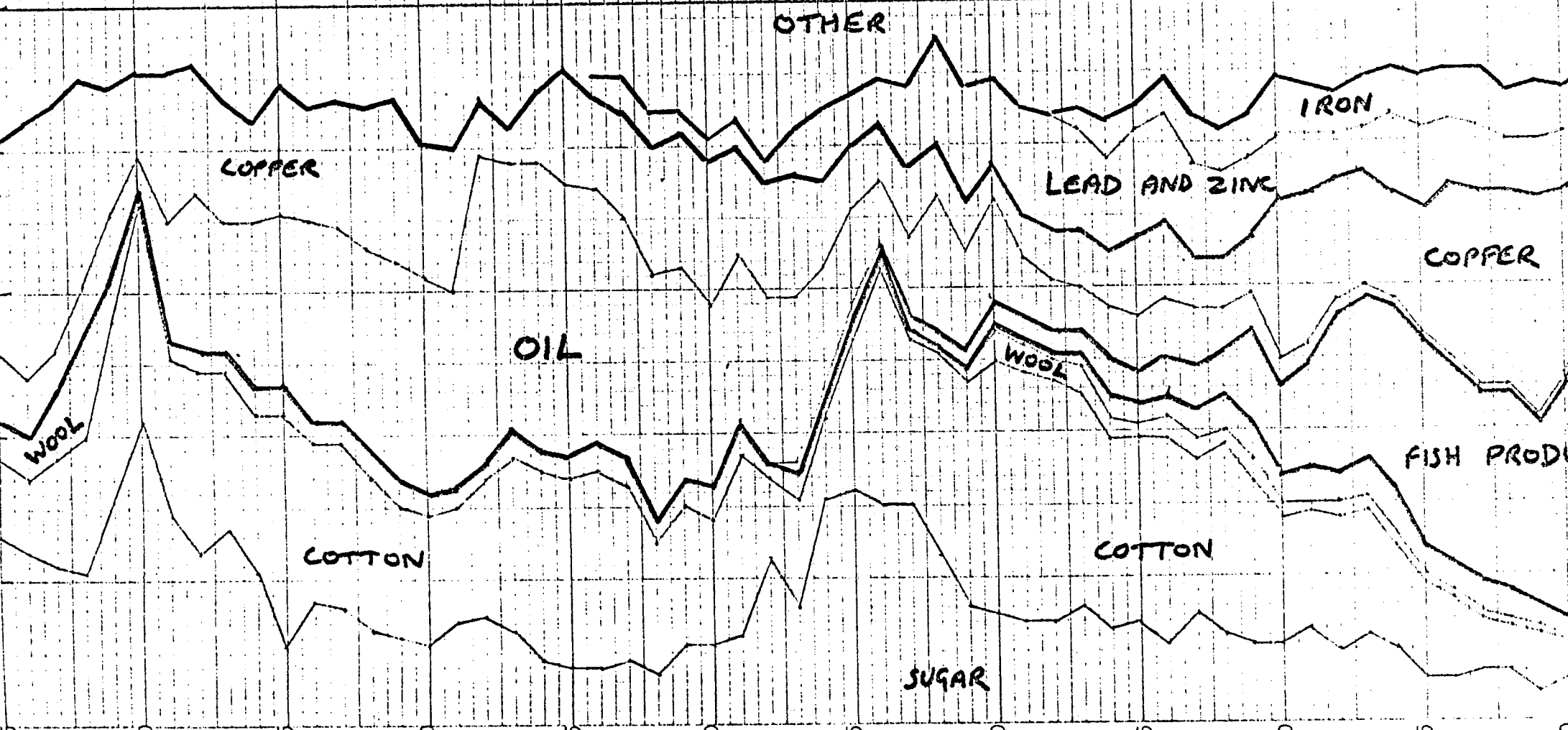

Table A2 Percentage Composition of Exports by Value.

Year	Total exports (US Dollars 000,000)	Sugar %	Cotton %	Wool %	Coffee %	Fish %	Oil %	Copper %
1915	56	26	11	5	-	-	10	29
1916	81	24	10	6	-	-	8	36
1917	91	22	15	9	-	-	6	34
1918	98	21	19	14	-	-	7	29
1919	131	31	25	6	-	-	9	18
1920	145	42	30	2	-	-	5	12
1921	84	29	22	2	-	-	17	21
1922	97	24	25	3	-	-	22	18
1923	104	27	22	3	-	-	18	17
1924	106	21	22	4	-	-	23	14
1925	94	11	32	4	-	-	24	18
1926	99	17	22	3	-	-	28	16
1927	107	16	23	3	-	-	27	18
1928	111	13	21	4	-	-	28	20
1929	117	12	18	4	-	-	30	23
1930	83	11	18	3	-	-	30	19
1931	55	14	16	3	-	-	27	20
1932	38	15	19	3	-	-	43	8
1933	48	13	24	4	-	-	37	10
1934	70	9	27	3	-	-	40	10
1935	74	8	26	3	-	-	38	16
1936	84	8	27	4	-	-	35	13
1937	92	9	24	4	-	-	33	15
1938	78	7	18	3	-	-	34	18
1939	72	11	20	4	-	-	29	19
1940	76	11	17	5	-	-	25	20
1941	80	12	25	4	-	-	23	15
1942	76	23	11	2	-	-	23	16
1943	71	16	15	4	-	1	23	17
1944	84	31	11	3	-	1	17	12
1945	104	32	21	3	-	2	13	9
1946	143	30	33	2	-	1	9	8
1947	116	30	23	1	-	2	11	10
1948	96	23	28	1	-	2	19	7
1949	144	16	30	2	-	2	14	7
1950	194	15	35	4	1	3	12	5
1951	253	14	34	5	1	2	8	6
1952	239	14	33	3	1	3	7	7
1953	222	16	29	4	2	3	6	8
1954	248	13	26	3	3	5	7	8
1955	271	14	25	2	3	4	8	11
1956	311	11	28	3	3	5	8	11
1957	330	15	21	3	4	6	8	7
1958	292	12	26	2	5	6	6	7
1959	315	11	22	3	5	13	5	8
1960	433	11	17	2	4	12	4	22
1961	496	13	16	1	5	14	3	21
1962	540	10	18	2	4	22	2	17
1963	541	12	17	2	5	22	2	16
1964	667	10	14	2	6	25	1	15
1965	667	6	13	1	4	28	1	18
1966	764	6	11	1	4	27	1	24
1967	757	7	7	1	4	26	1	27
1968	866	7	6	1	4	27	1	27
1969	866	4	8	1	3	25	1	30
1970	1,050	6	5	..	4	32	1	26
1971	893	8	5	..	4	38	1	19
1972	943	8	5	1	5	30	1	20
1973	1,041	8	6	1	6	14	..	27

Figures compiled from Anuario Estadistico and Cuentas Nacionales, various issues.

Percentage composition of Exports (cont.)

Table A2 continued

Year	Lead and zinc %	Iron %
1915		
1916		
1917		
1918		
1919		
1920		
1921		
1922		
1923		
1924		
1925		
1926		
1927		
1928		
1929		
1930		
1931		
1932		
1933		
1934		
1935		
1936	3	
1937	5	
1938	5	
1939	3	
1940	3	
1941	4	
1942	3	
1943	6	
1944	10	
1945	7	
1946	6	
1947	11	
1948	15	
1949	16	
1950	14	
1951	12	
1952	15	
1953	16	3
1954	14	5
1955	13	3
1956	15	5
1957	15	7
1958	13	6
1959	12	6
1960	11	8
1961	9	7
1962	8	6
1963	6	7
1964	6	6
1965	11	7
1966	11	7
1967	9	8
1968	9	7
1969	7	8
1970	8	6
1971	8	7
1972	11	7
1973	13	6

TABLE A3

The Percentage Contribution of Metal Mining to National Product.

Year	(1)	(2)	(3)
1933	4.7		
1934	5.4		
1935	7.5		
1936	8.0		
1937	8.6		
1938			
1939			
1940			
1941			
1942	11.1	8.6	
1943		8.0	
1944		6.5	
1945		5.6	
1946	7.4	5.3	
1947		5.3	
1948		4.0	
1949		7.4	
1950		7.2	3.1
1951		8.0	4.4
1952		8.3	4.1
1953		8.9	3.2
1954		11.2	4.3
1955		10.5	4.8
1956		11.0	4.9
1957			3.9
1958			3.3
1959			3.8
1960			6.7
1961			5.7
1962			3.9
1963			4.3
1964			4.5
1965			4.7
1966			5.1
1967			5.4
1968			7.3
1969			7.1
1970			5.9
1971			4.4
1972			4.3

Sources and Notes

Column (1) is the gross value of metal-mining output (including smelter output) divided by the national-product estimates of paulet and Ferrero. Value of mining output from Anuario de la Industria Minera 1947, p.12. National-product figures for 1933-1937 from P.E. Paulet, 'Informacion sobre las Condiciones Economicas y Sociales del Peru y sus Problemas Fundamentales' in Proceedings of the Eighth American Scientific Congress (Washington, 1943), Vol.8, p.263. National-product figures for 1942 and 1946 from R.A. Ferrero, Economy and Finances of Peru (Lima, 1947), p.8.

TABLE A3 (Cont'd.)

Column (2) is gross value of metal-mining output (from Anuario Minero 1947 p.12 and 1960, p.32), divided by the Banco Central's GDP estimates (from Anuario Estadistico del Peru, 1956-57, pp.346-347).

Column (3) is gross value-added in metal mining excluding value added in smelting and refining, divided by the Banco Central's revised GNP series. Value-added from Anuario Minero 1965, p.152, and 1972, p.141. GNP from Cuentas Nacionales 1950-1965 p.19 and 1960-1973, p.11.

It will be noted that the exclusion of smelting and refining from the 1950-1972 series means that the share of the sector is understated, and it is possible that inclusion of smelting/refining would produce more of an upward trend over time than emerges above.

TABLE A4

Employment in the Mining Industry, 1914-1972

Year	Metal mines	Smelters, concentrators	Power plants	Total	Mining and quarrying
1914	na	na	na	na	18,825
1918	na	na	na	na	19,210
1932	4,874	3,193	a	8,067	9,442
1935	8,864	2,598	323	11,785	13,293
1942	17,022	6,534	b	23,556	25,946
1945	15,130	6,518	656	22,304	25,751
1950	18,563	5,319	814	24,696	29,236
1955	22,182	7,062	1,067	30,311	35,021
1960	27,227	7,262	1,108	35,597	37,428
1966	29,826[c]	9,614	611	40,051	na
1970	37,698[c]	15,549	819	54,066	na
1972	36,648[c]	16,464	747	53,859	na

a. Probably included with smelters and concentrators; not stated.
b. Included with smelters and concentrators.
c. Including administration and other services.

Sources: From annual mining statistics: 1914, p.112; 1918, pp.173-176; 1932, p.287; 1935, p.399; 1942, p.202; 1945, p.309; 1950, p.214; 1955, pp.225-228; 1960, p.209; 1966, p.133; 1970, p.125; 1972, p.128.

Table A4 traces employment in the mining sector since 1914. These figures again indicate the rapid expansion of the late 1930's, stagnation in the 1940's, fairly steady advance through the 1950's and 1960's. Overall, employment trebled from 1932 (the Depression low point) to 1950, and then doubled again by 1970. The sector's share of the total labour force was 1.0% in 1950, 1.1% in 1961 and 1.3% in 1970[1] - consistently less than a quarter the sector's share of GNP, but with some slight tendency to increase. It should be noted that these labour force figures do not include employment in very small mines, and in individual enterprises such as gold washing.

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(1) Labour force totals from Cuentas Nacionales 1950-1965 p.38, and 1960-1972 p.30.

B. The Changing Composition of Output

Mining in Peru had by the end of the 1920's become dominated by the copper-silver mines of the Central Sierra, with the commanding height (the Oroya smelter) in the hands of the US owned Cerro de Pasco Corporation. The great bulk of mine output passed through the hands of Cerro, and promising deposits of any size tended to come quickly under Cerro's control, the latest example having been the taking of an option on the San Cristobal mine at Yauli. Independent Peruvian mining enterprises of any size were extremely scarce: the Fernandini mine at Colquijirca; the Sociedad Minera Puquiococha at Morococha; and the remnants of the old mining empire of Lizandro A. Proano virtually exhaust the list. Peruvian companies were in control of a large number of deposits which were being worked on a small scale; but since the entry of Cerro at the beginning of the century the general trend had been for independent Peruvian enterprise to fadefrom view beneath the Cerro umbrella.

The end of the first great golden age of copper, in the years 1930-1932, produced a change in the atmosphere of mining development in the centre, which was felt also in the other mining areas of the country as the 1930's progressed. The unchallenged dominance of Cerro and Northern Peru Mining and Smelting in the mining sector was significantly reduced during the 1930's and 1940's as mining output itself became more diversified. Several factors contributed to this process:

(a) The rising importance of metals other than copper in Peru's mineral exports brought a shift of emphasis towards ore deposits which had hitherto been left relatively untouched. This was particularly true of lead, zinc and gold - all metals which provided the basis for the formation of new and important independent companies.

(b) The significance of foreign control of the processing end via control of smelting (especially Oroya; to a much lesser extent Shorey) was reduced. Partly this was because the Oroya smelter lacked capacity for large-scale output of metals other than copper; though a lead blast furnace had been operating since 1927, the production of electrolytic lead was only just getting under way as the 1930's opened, and Cerro's zinc refinery did not open until the 1940's. This meant that much of the lead and zinc produced by independant mines was exported directly in the form of concentrates without being smelted or refined. Another minor factor contributing to erosion of Cerro's dominance was the recovery of Proano from his reverses of the 1910's and the reopening of his Tamboraque smelter to treat lead-silver ores, in 1930 or 1931.(1)

(c) Of the greatest importance, however, was the impact of a technological innovation which belatedly swept Peru in the 1930's and 1940's: the small flotation concentrator. Flotation had first been introduced to Peru in 1918(2) but had initially been confined mainly to the large plants established by Cerro at Quiulacocha, Morococha and Casapalca. After 1930, however, the number of small and medium concentrators operating increased very rapidly, and revolutionised the economics of mining. The advantage of these concentrators was that they were installed at the mine itself, and greatly reduced the bulk of the mineral that had to be transported out from the mine. Deposits which had previously been uneconomic (not large enough or rich enough to sell to Cerro; with large reserves of low-grade ore but

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(1) West Coast Leader, January 9, 1934, Supplement p.ii.

(2) Mario Samame Boggio, La Mineria Peruana, (Lima, 1971).

only limited pockets of high-grade, and with transport difficulties) now became profitable. The concentrates, once obtained, could be sold directly on the international market if the producer wished, and dependence upon Cerro and the Oroya smelter was correspondingly greatly reduced. Up to the First World War, mining companies wishing to work anything less than extremely high-grade ores had been obliged to smelt them; and smelting was an activity in which economies of scale, technological sophistication, and central location on the railway or other transport facility were of great importance (hence the rapid success of Oroya in forcing the closure of all the surviving competing smelters in the early 1920's). Smelting was particularly awkward in Peru because of the need to bring in large quantities of very scarce fuel. The concentrator, on the other hand, enjoyed enormous advantages over the old smelter. It could be operated on local water power, with very low fuel needs (and hence low costs of operation, in an area where the transport cost of fuel had crippled many smelters). It operated efficiently on low volume, and in particular could be operated in stops and starts depending on the supply of ore from the mine, without the problems posed by smelters under these conditions (freezing of the crucible, long heating-up period). And it could handle zinc - a metal which was not susceptible to extraction by old-style smelting, but which enjoyed a rapidly-growing world demand, and of which large deposits existed in Peru.

In 1935 seven companies were reported to be operating concentrators for copper, lead and zinc[1] (Cerro having two plants operating). By 1942 Cerro had three[2], Northern Peru one, and there were twelve other lead & zinc concentrators operating[3]. By 1948 there were at least 19 lead and zinc concentrators[4] in addition to the Northern Peru copper plant at Shorey. By 1954 there were 47 concentrators listed for lead alone.[5] In addition to the base-metal concentrators there was a rapid expansion during the 1930's of gold mining enterprises using concentrators - indeed, the gold companies really led the rush into concentrators in the 1930's.

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(1) Hohagen, 'La Industria Minera en el Peru 1935', BCIM No.117, p.276.

(2) Anuario de la Industria Minera 1942, pp.70-73.

(3) Ibid., pp.89 & 91.

(4) Anuario de la Industria Minera 1948, p.131

(5) Anuario de la Industria Minera 1954 pp.160-163.

TABLE B1

Table B1

Percentage Composition of Metal-Mining Output by Value

Year	Copper	Silver	Gold	Lead	Zinc	Vanadium	Iron	Other	Total
1913	56.3	35.1	5.8	1.6	..	-	-	1.2	100.0
1914	54.8	35.7	7.5	1.0	-	..	-	1.0	100.0
1915	61.0	23.2	5.7	0.7	..	7.4	-	2.0	100.0
1916	69.2	19.2	3.6	0.4	..	4.0	-	3.6	100.0
1917	68.8	22.3	3.3	0.4	-	3.4	..	1.8	100.0
1918	65.2	27.0	3.7	0.2	-	2.8	-	1.1	100.0
1919	51.1	36.7	4.7	0.3	-	6.9	-	0.3	100.0
1920	44.3	33.4	5.0	0.2	..	16.9	-	0.2	100.0
1921	49.2	36.4	9.3	0.2	-	4.9	-	..	100.0
1922	48.9	42.5	8.3	0.2	-	..	-	0.1	100.0
1923	46.5	41.8	8.7	0.2	-	2.8	-	..	100.0
1924	38.3	48.9	9.4	0.6	0.1	2.8	-	..	100.0
1925	37.1	46.6	7.1	2.3	1.0	5.9	-	..	100.0
1926	33.3	34.9	4.5	4.8	6.1	16.3	-	0.1	100.0
1927	40.6	30.9	5.7	2.3	4.3	16.0	-	0.2	100.0
1928	48.9	36.4	4.2	6.7	2.1	1.6	-	0.1	100.0
1929	46.1	23.9	5.3	6.9	3.8	14.1	-	..	100.0
1930	47.7	20.3	7.6	8.3	3.9	12.1	-	0.1	100.0
1931	61.7	18.9	12.4	1.9	0.1	-	-	5.0	100.0
1932	38.2	27.4	29.6	2.7	0.1	-	-	2.0	100.0
1933	39.4	27.6	25.0	1.0	0.1	-	-	6.9	100.0
1934	29.9	33.4	23.3	5.2	2.5	0.9	-	4.8	100.0
1935	21.1	47.0	16.6	10.5	2.8	0.3	-	1.7	100.0
1936	25.3	33.5	19.9	11.4	4.5	0.6	-	4.8	100.0
1937	30.9	23.6	21.7	16.8	2.7	1.7	-	2.6	100.0
1938	24.4	27.0	27.7	12.9	2.7	2.4	-	2.9	100.0
1939	24.7	21.5	28.0	14.0	3.1	3.5	-	5.2	100.0
1940	28.5	18.4	25.6	14.6	3.3	3.4	-	6.2	100.0
1941	25.0	14.9	27.5	16.9	5.9	3.0	-	6.8	100.0
1942	25.5	17.0	24.1	17.1	6.5	3.0	-	6.8	100.0
1943	23.4	18.1	19.2	18.7	8.4	2.5	-	9.7	100.0
1944	23.7	20.0	17.4	19.5	10.3	1.6	-	7.5	100.0
1945	23.3	19.1	17.1	20.0	12.5	2.1	-	5.9	100.0
1946	20.0	24.7	13.8	19.2	15.8	0.9	-	5.6	100.0
1947	20.3	15.2	7.9	33.4	16.5	0.9	-	5.8	100.0
1948	17.1	13.3	7.5	35.6	20.0	1.1	-	5.4	100.0
1949	20.1	13.0	9.1	36.0	17.4	0.8	-	3.6	100.0
1950	19.0	14.5	6.9	23.6	30.0	0.6	-	5.4	100.0
1951	18.9	15.7	5.6	29.6	22.8	0.7	-	6.7	100.0
1952	20.0	14.7	4.3	29.9	25.9	0.5	-	4.7	100.0
1953	21.1	14.7	4.3	26.6	15.4	0.4	12.6	4.9	100.0
1954	20.4	14.0	4.2	24.5	15.8	0.2	17.8	3.1	100.0
1955	25.6	14.0	4.1	24.9	16.3	0.1	12.1	2.9	100.0
1956	24.1	12.2	3.3	23.6	16.6	-	17.1	3.1	100.0
1957	19.6	13.0	3.3	23.1	13.5	-	24.9	2.6	100.0
1958	18.4	14.9	3.6	20.6	12.3	-	27.7	2.5	100.0
1959	23.1	18.9	4.2	19.4	13.2	-	18.2	3.0	100.0
1960	48.1	11.6	2.1	11.5	10.6	-	14.3	1.8	100.0
1961	50.6	12.1	2.1	9.5	8.0	-	15.6	2.1	100.0
1962	48.5	14.8	2.0	7.9	7.6	-	17.2	2.0	100.0
1963	41.6	17.4	1.4	9.6	11.1	-	16.7	2.2	100.0
1964	36.2	14.2	1.0	11.4	16.7	-	14.3	6.2	100.0
1965	40.2	13.5	1.1	12.3	14.1	-	15.1	3.7	100.0
1966	47.7	11.6	0.6	9.4	12.9	-	14.2	3.6	100.0
1967	45.7	11.7	0.7	8.5	12.8	-	16.5	4.1	100.0
1968	47.0	16.1	0.9	7.0	10.0	-	15.4	3.6	100.0
1969	53.3	11.9	1.0	7.4	9.2	-	13.9	3.3	100.0
1970	49.3	12.3	0.7	7.4	11.2	-	13.8	5.3	100.0
1971	43.9	12.5	0.8	7.5	17.1	-	14.2	4.0	100.0
1972	39.3	12.7	1.6	9.0	19.6	-	14.6	3.2	100.0

Source: Calculated from data in annual mining statistics. See attached data sheet.

Table B1 shows the percentage composition of mining output in Peru over the past half-century. The measure used to compare the various products is the value of metal content as estimated in each year by the official statistics.(1) A number of striking trends emerge. Most important is the 25-year depression of copper relative to other metals, from the early 1930's through to the late 1950's. Copper had accounted for roughly half of the total value of metals production up to the late 1920's, but between 1931 and 1935 it fell back sharply, to settle at about 25% of the total. From 1940 on there was a further downward trend, taking copper's share down to 20% where it remained until the opening of Toquepala. In 1960, with Toquepala in full production, copper's share returned to 50%, and although other metals briefly pushed it back to 40% in the mid-1960's, in the second half of the decade copper was firmly established with just under half of total metals output.

In very general terms, therefore, the twentieth-century history of metals mining consists of two periods of dominance by copper with associated (by-product) silver, separated by a long period (1932-1959) during which other metals competed for leadership. Following the collapse of copper in 1932 (closure of Northern Peru's Shorey smelter; sharply reduced Cerro operations at Oroya) its place was taken by the precious metals silver and gold, whose prices in international markets held up better than the prices of base metals. In the early-mid 1930's silver increased its share of total metals value to over a third (reaching 47% in 1935). It was then displaced by gold as the gold-mining boom of the late 1930's took hold; gold

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(1) For comments on the shortcoming of these estimates see Appendix II. It is unlikely that better valuation techniques would materially change the pitcure given in Table B1, however.

raised its share of the total to nearly 30% in the late 1930's. Both of the precious metals, however, were in their turn pushed aside by a trend which had become apparent during the late 1930's: the rise of a new base-metals sector producing lead and zinc. Lead and zinc between them accounted for 13% of total output in 1935, a substantial increase from the level in the 1920's. By 1940 their combined share had crept up to 18%, and the 1940's witnessed a rapid blossoming. In 1947 the two metals reached 50% of total output, and held this share until they in turn began to be displaced by another newcomer, iron, in 1953. The expansion of iron dominated the picture until 1959, when copper reasserted its former dominance.

These swings in relative shares of output correlate closely with the changing focus of attention in mining development. The early 1930's saw a new emphasis on silver and gold, reflected in government policy measures and the formation of a number of new companies. The late 1930's brought the entry of new enterprises into lead and zinc - perhaps most importantly, the Compania Minera Atacocha, formed in 1936. The outstanding feature of the silver, gold, lead and zinc expansion of the 1930's and 1940's was that this was an expansion of the 'pequeña' and 'mediana' mineria relative to the giant foreign firms which had dominated the 1920's - a process encouraged, as noted already, by the spread of the small-scale flotation concentrator, and the entry of the Banco Minero as an independent processor of custom ores in the 1940's.

The 1950's brought a swing back towards the large-scale sector, with the main effort being directed towards two gigantic

projects: the exploitation of the Marcona iron deposits by a new foreign enterprise, and the development of low-grade copper at Toquepala by a consortium of Cerro and Northern Peru Mining and Mr. US firms - the new Southern Peru Copper Corporation. Corresponding to this, the initiative in mining development passed from the local firms which had led in the 1930's and 1940's and early 1950's back to the foreign firms once again.

C. Share of Large Foreign Companies in Output.

Table C1 presents the results of an analysis of the detailed statistics on the value of mining output. The object of the exercise was to estimate the proportion of the total value of metals production which was accounted for by large foreign capital. Since a number of methodological problems naturally arose, the derivation of the figures in Table C1 requires some explanation.

In the first place, it was necessary to draw a line between 'large foreign' firms and others. This is by no means so easy as it might seem, because of the presence of foreign capital also in the medium and small-scale sector, and because of the fact that foreign firms which were giants in one period might be midgets in another. For example, the Northern Peru Mining and Smelting Company, in its heyday in the 1920's, had clearly earned the right to be treated as a large foreign firm (and its continuing status as a subsidiary of American Smelting and Refining, and part-owner of Southern Peru Copper Corporation, seem to justify keeping it in the list even in periods when it was a relatively insignificant producer). The French-owned Compagnie des Mines de Huaron, on the other hand, which outpaced Northern Peru in the 1930's and 1940's, has not been included as a large foreign firm, and the same is true of the Anglo-French Ticapampa company, taken over by Grace in the 1960's. The group of companies operated by L.J. Rosenshine, despite their foreign connections, have been considered as independent firms, rather than foreign; and several other small producers with foreign owners have also been so treated - the Santo Domingo gold mine, the Caylloma silver-lead-zinc mine, and the Hochschild properties, provide examples.

Secondly, the actual calculations involve certain difficulties. The nature of the available statistics makes it necessary to define a company's share of the value of output of a metal as equal to its share of physical production of metal content multiplied by the total 'valuation' of Peruvian output of the metal, as given in the official statistics. This method, obviously, takes no account of the fact that the actual unit value of metals contained in the products of smelters and refineries is higher than the value of output contained in ores and concentrates. Thus the share of the large foreign firms in value-added in Peruvian mining has been greater than their share of metals output as shown in Table C1, because of their control of the main smelters and refineries. Table C1 is thus based in fact upon a form of crude quantum index (see the detailed data for construction of the table, provided in Appendix I).

With all these reservations made, however (and noting in addition that limitations of time have made it necessary to estimate only for one year in every five, which may distort trends), the pattern shown in Table C1 is a striking confirmation of the comment made earlier, that foreign influence in Peruvian mining suffered an eclipse during the 1930's and 1940's. By the end of the Second World War large foreign firms accounted for only about a quarter of the metal content dug from Peru's mines, compared with well over half at the end of the 1920's, and over 60% in the 1960's. (This is not to deny that the large foreign firms had by far the largest excavations - on a visual inspection of Peru's mining areas, the dominance of the large producers seems much greater than is shown by the statistics. This is simply because the smaller deposits worked by the independent companies have much higher grades of ore, and the quantity of rock which has to be shifted to obtain a unit of metal

output is proportionately far less. An insignificant-looking operation on a very rich vein may have in fact a metal output comparable to a much more spectacular-appearing opencast excavation on a low-grade ore body.)

It can be clearly seen from Table C1 that the key to the renewed dominance of large foreign firms in mining after 1950 was the entry of the new companies, Marcona Mining and Southern Peru Copper. Cerro's renascence in the Centre in the late 1940's and early 1950's did not restore the company to its relative importance of the 1920's and 1930's; and during the 1960's its operations steadily fell back in relative importance as the grade of the remaining ores in the region's mines fell.

The difference in the table between the output of Cerro mines and the output of the Oroya smelter deserves some further comment. The Oroya output is generally greater than the company's output of metals in the form of ores and minerals, because of the practice of buying-in 'custom ores' from independent producers. This is particularly evident in the case of metals such as copper and silver. On the other hand, not all of Cerro's own production of ores and concentrates is passed through the Oroya smelter before being sold; this has in particular been the case with zinc, large quantities of which have always been exported as concentrates (note, in Appendix I, the fact that Cerro's 'mines' output of zinc appears always higher than the 'Oroya' output, despite buying-in of ores). Thus, although the 'ores and concentrates' table shows the complete output from mines and concentrators controlled by Cerro, the Oroya output series does <u>not</u> show the full total of processed output actually sold by Cerro. The gap between Cerro's share of mine output, and its share of total processed output in Peruvian mining is thus understated in Table C1 by the amount of lead and zinc concentrates produced by Cerro but not treated at Oroya.

TABLE C1

Shares of Large Foreign Firms in Metals Output: Percent

Year	Cerro (ores & concentrates)	Cerro (Oroya)	Northern Peru	Marcona	Southern Peru	Total, 4 firms using Cerro ores & concs	Total, 4 firms using Oroya for Cerro
1935	44.0	61.3	6.7	-	-	50.7	68.0
1942	24.7	62.6	3.6	-	-	28.3	66.2
1945	22.9	57.7	4.9[b]	-	-	27.8	62.6
1950	35.1	42.0	6.0	-	-	41.1	48.0
1955	36.7	37.7	6.0	12.1	-	54.8	55.8
1960	16.6	25.2	2.4	11.2	34.4	64.6	73.2
1965	21.8	29.9	2.3	13.4	26.6	64.1	72.2
1970	16.6	24.3[c]	1.9	13.8	33.3[a]	65.6	73.3[c]
1972	19.8	24.8[c]	1.8	14.6	24.8[a]	61.0	66.0[c]

a. Excluding gold and silver, which cannot be separated from the aggregate figures.

b. High upper-bound estimate.

c. Attributing all smelted/refined gold and silver (except 'lavaderos') to Oroya - i.e. upper-bound.

Source: Appendix I.

Note: Remember these are not shares of value added, nor of actual sale value. They are shares of a crude valorizacion of quantum output.

Obviously, the great weakness of Table C1 is that it begins in 1935, after the collapse of copper's share of mining output, with the result that the extent of the decline of foreign dominance in the 1930's is understated. Considering that virtually all the copper, and a large part of the silver and gold, produced in the 1920's were turned out by Cerro and Northern Peru, Table B1 strongly suggests that these two companies must have accounted for comfortably over 60% of total mine output in the late 1920's. In addition, the Vanadium Corporation (not included in Table C1) saw its Peruvian operations pass their peak at the end of the 1920's, further contributing to the shrinkage of large foreign dominance (see Table B1). To what extent the revival during the 1930's of some smaller foreign enterprises (Huaron, Ticapampa, Santo Domingo) offset this shrinkage has not been analysed.

A further point to emerge from Table C1 is the great stability of the new balance between large foreign firms and others from 1960 onwards. The large foreign firms held a steady 65% of mine output, and three-quarters of final output of the sector, until their position was eroded by falling copper prices in the early 1970's. It is perhaps worth noting also that the part of the 'gran mineria' recently nationalised and turned over to Mineroperu - the Cerro operations - consists of an enterprise whose importance has shrunk dramatically since its days of almost complete dominance of the national mining industry in the 1920's.

TABLE D1

Regional Distribution of Mining Output (Metals) by Value: Percentages

Year	Centre	Mid-North	Mid-South	Southeast	Far South	Other
1915	89.8	6.9	1.1	..	2.3	-
1920	90.2	6.2	1.5	..	1.8	-
1942	70.7	11.1	8.4	2.5	7.3	-
1945	73.0	14.9	4.4	0.6	7.0	-
1950	78.0	10.3	6.3	0.9	4.4	-
1955	64.1	12.2	17.9	0.2	5.7	-
1960	36.7	4.6	13.1	0.8	41.8	-
1965	39.6	4.8	20.0	0.5	35.3	-
1970	33.9	5.3	24.7	..	35.9	0.2
1972	41.8	4.7	25.8	0.5	27.0	0.

Sources: Annual mining statistics: data extracted and calculated.

Definition of regions: These are grouped as in the recent editions of the mining statistics, as follows:

Centre: Pasco, Junin, Lima, Huanuco

Mid-North: Cajamarca, La Libertad, Ancash, Amazonas

Mid-South: Ica, Huancavelica, Ayacucho, Apurimac

Southeast: Cuzco, Madre de Dios

Far South: Arequipa, Moquegua, Tacna, Puno.

D. The Regional Impact of Mining

Table D1 sets out the value of metal-mining output by department, to show the changing regional emphasis. Clearly, as this emphasis shifted, so did the distribution of income generated by the sector, and the location of employment opportunities in mining. At the local level, developments too small to show up in these highly-aggregated figures could of course be of enormous importance - a single mine can transform the economy of the surrounding area by providing cash wages, opportunities for social and geographic mobility, improvement in local infrastructure (especially roads), and a large range of peripheral service occupations (lorry transport, merchants, wood supply, etc.). The opening of Northern Peru Mining Company's lead-zinc mine at Chilete in 1952 for example brought the company into competition with the sugar planations of Lambayeque in the labour market.(1) The expansion of gold mining in the Pataz region of La Libertad involved the incorporation into the cash economy from the 1920's on of an extremely isolated area of 'traditional' agriculture. The new lead-zinc technology of the 1930's revived old silver-mining areas which had lain dormant since the collapse of the silver boom in the 1890's (examples are Antonio de Esquilache in Puno; Chilete in Cajamarca; the San Agustin mine at Hualgayoc; the Castrovirreyna area). The development of iron at Marcona (Ica) and of copper at Toquepala (Tacna) introduced large-scale mining to regions from which it hadpreviously been absent. Mining activity in Arequipa until the 1960's was dominated by the precious metals silver and gold, and fluctuated with their fortunes. As different metals rose and fell, so did the corresponding companies and regions.

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(1) C. Scott, personal communication.

From Table D1 it is obvious that between 1920 and 1942 (data for the intervening years are lacking) there took place a significant decentralisation of Peruvian mining away from the Central Sierra. Junin-Pasco-Lima, which had accounted for no less than 90% of total mining output in 1920, had dropped to 71% by 1945, and subsequently fell to only 38% by 1965. The first stage in this decentralisation was of course the development of deposits in La Libertad by Northern Peru Mining and Smelting during the 1920's. Subsequently the gold boom boosted the importance of Arequipa, La Libertad, Puno, Ica and Ayacucho. At the end of the 1940's the Centre recovered some ground as Cerro pushed ahead with lead-zinc development, but the lead-zinc boom affected also widely-scattered areas - notably Cajamarca (where the effect of Chilete in the mid-1950's is obvious), Puno, and Ancash.

Ica, which had experienced a shortlived burst of goldmining activity in the late 1930's and early 1940's, came into the picture in a big way with the opening of Marcona in 1953; and Tacna, which had been insignificant as a mining department, became the leading producer in the country with Toquepala in 1960.

These figures, however, serve merely to illustrate what can be analysed more usefully by detailed product-by-product work such as is undertaken in the next section.

E. Sectoral Case Study: Gold

The history of gold mining in Peru during the last century has been very strongly cyclical - more so than has been true of any other metal. The key to understanding this history is the fact that the international (and Peruvian domestic) price of gold is fixed institutionally over long periods, as part of monetary policy; and is subject to sharp once-for-all increases in periods of monetary crisis when either the local or international (or both) currencies are devalued against gold. Each such sharp revaluation of gold has stimulated a sudden wave of interest in the development of Peru's gold deposits; but the rush tends to be cut off by subsequent cost pressures as general prices rise relative to the fixed gold price. The key to success in gold mining was therefore rapid entry while the early high profit margins persisted, and the incentive to exploit deposits to the utmost during the good years was very strong. This, combined with the relatively small size of most gold deposits in Peru, meant that the successful gold ventures of the 1930's and 1940's, for example, were large operations relative to the ore reserves on which they were based, and had quite short life-spans as major gold producers (though some later diversified into other activities).

From what has just been said, it is obvious enough where to look in Peruvian economic history for evidence of expanding gold-mining activity. The monetary crisis of the mid-late 1890's, and in particular 1897 before adoption of the gold standard, produced a great gold rush, with dying echoes into the first decade of the twentieth century; but by the First World War this gold boom had faded away almost entirely. The abandonment of the gold standard by Peru in 1932, and the US devaluation of 1934, produced a second boom, reflected in the production statistics (Figure B2) for the late 1930's; but by the late 1940's this boom also was evaporating, and gold fell away to very slight importance as a primary mine product during the 1950's and 1960's. The

recent upward movement of gold prices following the establishment of a free market in 1973 has set off a further wave of interest, manifested to date mainly in the intensified exploitation of placer deposits in the montaña, but involving also, for example, plans to reopen the old Santo Domingo mine.

Gold occurs in many areas of Peru, in the form both of ore deposits (quartz veins) and of alluvial placer deposits. Both forms were worked in the Colony; the Aproroma gold placer, for example, was worked by the Spaniards on a vast scale (for that time) using sluicing techniques.(1) The smaller placers along many of the rivers of the montana have long been worked by groups of Indians from Sierra communities, using pans and primitive stone sluices. Vein deposits were also worked by the Spaniards at Pataz and at the Cochasayhuas mine in Apurimac province (rediscovered in the early twentieth century). By the 1880's and 1890's, however, there was very little interest or activity remaining in gold mining; the main nineteenth-century emphasis had lain on silver. It was the collapse of world silver prices in the late 1880's and into the 1890's that revived interest in gold, as the silver sol fell steeply against the gold currencies of the world.

The first large-scale response to the new opportunities in gold was an attempt by the Compañia Minera El Gigante to reopen one of the old mines at Parcoy, near Pataz, and extremely isolated area on the eastern slopes of the Andes near the Marañon River, inland from Trujillo. The area was accessible only by mule over very rugged trails. The oxide ores (which could be treated by the amalgamation process) had been worked out long since, and the only nineteenth-century production of importance had been the washing of alluvial deposits by the local Indians

(1) West Coast Leader October 17, 1933, pp.22-23 gives the history of Aporoma.

in order to pay the annual Contribución de Indígenas; with the suppression of this tax, washing activity had practically ended (and the former rich pickings traditionally associated with the post of Sub-Prefect in the province came to an end).(1) Further development of the ore deposits became possible only when a new technology was introduced capable of dealing with sulphide ores. (note the similar problem in silver, where the uselessness of amalgamation for the treatment of sulphide ores led in the 1890's in Peru to introduction of the Patera leaching process). The new technology in this case was the cyanide process, first brought to Peru by the Cía El Gigante under licence from the patent-holders, the Cassel Gold Exporting Company. The main piece of machinery involved, a 20-ton-daily-capacity mill, was ordered in 1894 or 1895, but getting it to the field proved an enormous task. The company spent three years building a trail 30 leagues inland from Mollepata(2) (the former roadhead) and constructing a wire-cable bridge across the Marañon (this cable or its successor was still in use in the 1930's as the only means of land access to Pataz). The machinery was hauled in over this trail by mule and manpower(3) and installed at the mine, but by the time the equipment was ready working capital had run out, and the company failed. As is described below, the Parcoy mines, after a chequered thiry-year history, eventually became the basis of the successful Sindicato Minero de Parcoy in the 1930's.

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(1) See the Memorandum from Agustin de la Torre Gonzalez to the Peruvian Senate in Senado, 1897 Ordinary Session, Diario de los Debates, pp. 533-535.

(2) The Senate debate (see preceding reference) on a request from the company for remission of the 3% export tax on cyanide precipitates is the source for information to this point. The request was presented by the company's Manager, Honorio Medel y Ruiz, and accompanied by a memorandum from the Managing Director A. de la Torre (probably of Trujillo, hence a forbear of Haya de la Torre).

(3) El Economista (Lima) April 17, 1897, p.480 reported that the El Gigante machinery had been on the trail for over a year. May 29, 1897 pp. 580-581 stated that after two years' work the company had still not got all its equipment to the site.

Another event of the early-mid 1890's, however, augured rather better for goldmining in isolated areas. In 1890 an Indian from Macusani, Mariano (?) Quispe, while gathering cinchona bark in the montana of Carabaya province (in Puno) stumbled upon an extremely rich gold vein. He showed the vein to two leading Macusani citizens, Francisco Velasco and Manuel Estrada, who staked claims on the area.(1) A four-stamp water-driven mill was taken in by mule and installed in 1891, and the mine quickly became a sensationally large producer by Peruvian standards. Velasco and Estrada, with their original equipment, were soon recovering 14 oz. of gold (worth £280) daily. By the mid 1890's (at the time the mine was sold) production had risen to 7 lb of fine gold daily obtained by amalgamation.(2)

In 1894 the Union Oil Company of California sent its President, W.L. Hardison, to inspect the Peruvian oilfields. Hardison does not seem to have been impressed by the oil prospects, but he was certainly impressed by gold samples from the Santo Domingo mine, and after travelling in to the mine with a Los Angeles capitalist, Chester Brown, he obtained an option on the property for £210,000.(3) The option was exercised at the end of the 90 days, but in the interim Velasco and Estrada, understandably enough, had worked out all the rich ore in sight as fast as possible, obtaining £300,000 worth of gold in 87 days. When the Hardison syndicate took over the property it was in a bad condition, with the new tunnels inadequately timbered to withstand the rainy season; the result was that much of the mine quickly collapsed, and it ceased producing until 1897. During

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(1) Quispe, it seems, 'fell over a cliff and was drowned' immediately after revealing the location of the mine. This and other information in this paragraph is from Josephine Woods, High Spots in the Andes (extracts published in West Coast Leader, November 19, 1935, p.21.). Dunn, W.E., Peru: A Commercial & Industrial Handbook (1925) states, on the other hand, that the lode mines at Santo Domingo had been known since the early Colony (p.456).

(2) El Economista, February 6, 1897, pp.327-328, 'Las Ricas Minas de Carabaya'.

those three years Hardison (having become the local manager) repaired the workings and installed a 20-stamp mill.(1) A young Peruvian engineer, Fernande Fuchs (a name familiar in the later history of Peruvian mining) was hired, and 250 men were employed on construction of a road (mule trail).(2) In 1897 the mill capacity was raised to 120 tons of ore daily, with 80 stamps.(3)

In mid-1897 rumours began to circulate that Hardison was negotiating sale of the property or partnership with other capitalists(4) and in August it was reported that the mine had been sold to another US group for £500,000.(5) The details of this period are not at all clear; but the reports of sale seem to have been incorrect, since the owners after 1900 appear to have been the same as the original group.(6) At any rate, the company was a vast success. Its capital as of 1896 was reported to be S/2.6 million,(7) (about $1.2 million). Gold production between 1897 and 1914 totalled around $12 million worth, of which $5.5 million(8) was plowed back in further mine development, construction of the mule trail from Limbani (which alone cost $1 million(9), and the establishment in the early

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(1) El Economista January 23, 1897, pp.293-294; and May 29,1897,p.579.

(2) El Economista January 23, 1897, p.294.

(3) El Economista May 29, 1897, p.579.

(4) El Economista September 18, 1897, p.758.

(5) El Economista August 7, 1897, p.743. The issue of September 18, 1897, reported on the other hand (p.4) that the sale had been to a London syndicate for £600,000; this evidently was a misunderstanding.

(6) Woods, op.cit., states that in addition to Hardison and Brown, the initial syndicate included Lewis Emery (a Pennsylvania oilman), Joseph Seep, and Charles Collins, West Cost Leader, November 13, 1920 also definitely stated that Emery (later the sole owner) had been in the original syndicate, though that report dated the purchase in 1896.

(7) 'El Nuevo Ano de 1897' in El Economista, January 9, 1897,p.264; and Sinopsis Geografico y Estadistico del Peru 1898,p.191.

(8) Woods, op.cit. Basadre, Historia de la Republica,pp.3187 and 3491 notes the emergebnce of Inca Mining as the leading gold producer of the turn of the century. Also Purser, Metal Mining in Peru, p.106 gives 1896-1909 output as 10 tons.

(9) Woods, op.cit.; West Coast Leader, November 11, 1920, reports that the road construction took from 1896 to 1905. Dunn,op.cit., p.480 also notes the road-building activities of the company; motor vehicles could never get beyond Huancarani (as was still

1900's of the Inca Rubber Company to exploit the rubber resources of the Madre de Dios.

It was against this background that a major gold rush atmosphere developed in Peru during 1897, as the slide of silver prices against gold continued. Although the rush was shortlived (Peru's adoption of the gold standard, followed by rapid domestic inflation during the 1900's, pushed out most producers) it was dramatic, and occupied the attention of many prominent Peruvian promoters in addition to a growing number of foreign companies. At Pataz a concession of 85 pertenencias was staked out in early 1897 by a syndicate headed by Eduardo Gonzalez Orbegoso including Enrique Barreda and Jose Payan.(1) At Chuquitambo near Cerro de Pasco the gold mines of La Quinua were developed by two Peruvians, Bonany and Besada,(2) who later (1901) sold out to a British company. The Andaray gold deposits in Arequipa (site of one of the leading gold companies of the 1940's and 1950's) were taken over by a new company, the Sociedad Aurífera de Andaray Ltda, organised in Lima with capital of S/500,000. The provisional directorate of the new company indicated the gold fever then current in Lima business circles: the company president was Manuel Candamo (later a Civilista President of Peru) and several other directors also had strong Civilista and business connections: Augusto B. Leguía, Baldomero Aspíllaga, Rafael Canevaro, Ambrosio Nosiglia.(3)

The real rush, however, centred on the Carabaya region of the Puno montaña, where the Santo Domingo mine had aroused vast

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(1) El Economista, March 27, 1897, pp.433-434. The full list of the syndicate members was: Eduardo Gonzalez Orbegoso, T.X. Aguirre Jado, Alejandro Arenas, Enrique Barreda, W. Dik, E.C. DuBois, Vicente Gonzalez Orbegoso, Carlos Ludowieg, Julio Ludowieg, Jose Payan, Guillermo Salcedo, J.M. Iturregui, and Cesar Gongora. Note that the Gonzalez family seems to provide a link between this Orbegoso syndicate and the De la Torre Gonzalez enterprise, El Gigante.

(2) El Economista, January 9, 1897, pp.264-265.

(3) El Economista, July 17, 1897, p.695. The 'direftores suplentes' were Jorge Broggi, Andres Dall'Orso, and Gregorio Quiroga. The previous owners of the Andaray mines, Juan Figari e Hijos, were reported to have received 1,500 of the S/100 shares in the new company in payment for the property.

expectations, Peruvians, Chileans, and other foreigners poured into the area during 1897. Among the leaders was Francisco Velasco, one of the former owners of Santo Domingo, who in May 1897 was reported to be taking in a 5-stamp mill for the Sociedad Minera Allín Ccapac, and to have staked out Cerro Benditani (another of the 1930's mines) and Cerro Matacaballo.(1) Juan Pardo made the journey into Carabaya to investigate gold placers,(2) and Manuel Peña y Costas took over the San Antonio de Poto placer deposit(3) (which remained in the family until the 1960's). 'Senores Rizo Patrón and Diez Canseco' formed a syndicate to prospect the Inambari placers.(4) Perhaps the most interesting new venture (and certainly the one with most significance for the future of Peruvian mining) was a syndicate in New York organised by none other than James B. Haggin, with 'the merchants Beechy and Duvall', to invest £30 million in Carabaya gold exploration;(5) this scheme, needless to say, did not come to fruition, but probably was what first aroused Haggin's interest in Peru.

In addition to the big capitalists, a host of small operators descended on the Puno goldfields. There was a general abandonment of the rubber industry in the Madre de Dios in response to the new opportunities perceived in gold digging.(6) Probably the biggest beneficiaries of the exercise, however, were the Arequipa merchants who outfitted the expeditions of 1897.(7)

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(1) El Economista, May 1, 1897, p.513.
(2) El Economista, June 12, 1897, p.612.
(3) Ibid.
(4) El Economista, January 1, 1898, notes the existance of the Cía Minera de Sandia y Carabaya (capital S/40,000) and the Cía Aurífera La Oriental (S/20,000) which may correspond to some of the above ventures.
(5) El Economista, September 18, 1897, p.758:'probable Sindicato en Nueva York para Sandía y Carabaya.'
(6) El Economista June 12, 1897, p.612, 'Noticias de Carabaya y Sandia'. In addition to the Inca, Pena and Pardo ventures, this article listed nine other enterprises active in the field, of which four were quartz-vein mines: Rosario-Carnaval (Vernal y Castro); El Carmen (Guemes Iriarte); San Francsico (Castillo) and Lunar Grande (F. Zavala and Vernal y Castro). Guemes Iriarte, Romulo, Espinar, Hipolito Sanchez y Cia, and Lucas Montesinos were all reported working placers, in addition to an Indian comunidad active at Chaquiminas. El Economista July 31, 1897, p.729 reports a further venture in Carabaya by a syndicate of Jose Carlos de la Torre(? of Cuzco?),

Local elites also got in on the goldrush act in several areas. In Huanuco, Augusto Durand with Miguel Bonani set up a gold-washing operation on the Río Cayumba;(1) while in Paucartambo (Cuzco) the discovery of a gold vein by a US engineer, Samuel Sheifer, was quickly followed by formation of the Sociedad Minera de Paucartambo (capital S/50,000) by Sheifer in partnership with a bunch of Cuzco notables.(2) A general rush of Cuzco people to stake claims around the new find was reported, the expectation evidently being that the mines would be bought up by French, US or English interests (all were investigating the area).(3)

Already by 1898, the gold fever seems to have died; the spate of articles on the subject in 'El Economista' dried up, and attention turned more towards sugar, manufacturing, and the new nine-days-wonder of the Cerro de Pasco copper boom. The great majority of the Peruvian ventures of 1897 became moribund or disappeared. The surviving foreign-owned gold producers were the Inca Mining Company and the British at Chuquitambo.(4) A number of other foreign companies were formed during the years 1896 to 1903 to seek and develop Peruvian gold, but few made any impression; those floated on the London Stock Exchange, in particular, mostly vanished without trace.(5)

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(1) El Economista June 19, 1897, p.636.
(2) El Economista, February 6, 1897, p.328, and July 10, 1897, p.681.
(3) El Economista, February 6, 1897, p.328. The leading participants in the Paycartambo venture were reported as: Samuel Sheifer, Jaime Valenzuela (who owned the claims on the area), J.M. de la Torre, Rodrigo Aurelio, Sres Puyo, Larrea, Zollerzzi; Dres Medina, Araujo, and Rehberg.
(4) Chuquitambo Gold Mines Ltd. was formed in London in 1901, and began working the La Quinua mines in 1902 (Stock Exchange Year-book, 1920, p.1674). A 40-stamp mill was installed and production stepped up (BCIM No.16, 1904, p.40; West Coast Leader, September 3, 1921, p.7). The enterprise's history, however, was not a happy one. The mine was closed in 1904, and the company reorganised in 1907 to raise working capital and reopen it. Capital was raised from £35,000 to £50,000 in 1911, and a 100-ton cyanide plant was installed. In 1921 the company had again to be bailed out, by an injection of capital from the New Nimrod Co. of London (All from Leader September 3, 1921, p.7 and April 5, 1922 p.19). The mines showed intermittent profits during the 1910's and early 1920's (Dunn, op.cit., p.402 notes them as the main goldfields producer of the Centre) but by the 1930's it had faded from the scene.

A late development after the main surge of interest in Lima had died away, however, was also to be important in the later history of gold mining. This was the rediscovery and reopening of the Cochasayhuas gold-mine in Apurimac by the Compania Cotabambas Aruaria, established in 1902 by Isaac Alzamora and Nicolas de Pierola (Both then at the peak of their careers in Lima).(1) The Cotabambas Auraria remained until the late 1920's one of the leading Peruvian-owned mining ventures,(2) and in the early 1930's its successor company was briefly a pacesetter for the new gold rush.

Note (5) of Page 37:

Among the early ventures, the Montesclaros Gold Mining Company (British, £70,000) failed through poor management (El Economista February 20, 1897, p.358); the Macate Gold mining Company (British, £135,000) which ran into technical trouble with difficult ore (El. Economista, April 9, 1898, p.468); the French Luicho Gold Mines worked briefly in Parinacochas and at Guayllura in Arequipa (El Economista, January 23, 1897, p.295 - Cie Francaise de Mines d'Or de Luicho, capital Frm; see El Economista January 9, 1897, p.263); A later large British venture, Aporoma Goldfields Ltd., formed in 1910 to buy the Aporoma gold placers in Sandia province with paid-up capital £226,000 by 1911 and £253,000 by 1920, had barely rehabilitated the property after a dam collapse when the First World War interrupted production. the company staggered along producing occasional small quantities until it was reorganised in 1927 and finally sold off in the 1930's (see below). (J.F. Rippy, British Investments in Latin America..., p.53; Halsey, F.M., Investments in Latin America and the British West Indias (1918) p.520; Stock Exchange Yearbook 1920, p.1559; Dun, op.cit., p.486; Leader, January 5, 1926, p.7, and October 17, 1933, pp.22-23).

Notes of Page 38:

(1) H. Karno, 'Augusto B. Leguia: the Oligarchy and the Modernisation of Peru, 1870-1930' (PhD, UCLA, 1970) p.63, quoting Cixpriano Laos, Lima, la Ciudad de los Virreyes (1928) p.600.

(2) Dunn, op.cit., p.174; B.O.M.P. No.8 (1924) p.191; B.O.M.P. No.26, p.88.

There were some signs of a revival of interest in gold mining in the years immediately preceding the First World War. Although the Inca Mining Company was running into difficulties of technical and managerial origin, the two other major companies (Cotabambas Auraria and Chuquitambo) were rapidly building up their production at this time, and a string of new enterprises were floated, very few of which lasted more than a fewyears. The 1914 mining statistics mentioned a number of these companies,(1) and indicated significant production of gold not only in Puno (Inca), Ayacucho (Cotabambas) and Junin (Chuquitambo and Cerro), but also in Arequipa (the Andaray-Posco company) and at Pataz, where a burst of new activity was evident.(2) By 1917-18, however, most of these ventures had disappeared.(3)

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(1) BCIM No.82, pp.46-58. Included in the list are: Sindicato Argentino Peruano, working the Viscachani placers in the Poto region of Puno; Ananea Goldfields Ltd., also formed to work placers in Puno, which was in 1914 trying to borrow working capital in London; Inambari Gold Dredging Concession Ltd., which had spent large sums of money and enormous effect in transporting two gold dredges into the montana of Madre de Dios; an unnamed foreign syndicate which had taken options on the Montebello and Benditani mines in Puno. The Inambari venture was recalled in the West Coast Leader, January 6, 1931, where the cost of carrying in the dredges (by mule from Tirapata) was put at £200,000. Only 12 ounces of gold were recovered by the first dredge before it sank in a flood. The second, ready to start work by the end of 1914, was abandoned when the company went broke.

(2) At Pataz, four important ventures were working when the 1914-18 war broke out. At Buldibuyo the Buldibuyo Gold Mining Company (capital £p5,000 subscribed by British residents in Peru) had a 10-ton amalgamation mill in operation by 1914, while at Parcoy Mariano C. Tarnawiecki had leased the old properties and mill of the Eg Gigante company. Three companies formed in England - Peruvian Consolidated Gold Trust Ltd., Gresham Finance Corporation, Ltd., and Pataz Gold Mining Company - had merged under the name of the first, to take over various properties formerly owned by the Chimbote Concession Syndicate Ltd. (formed about 1908 to undertake the proposed Chimbote harbour works and railway). At Pataz the San Francisco mine (later the basis of the operations of Northern Peru Mining and Smelting Company in the region) was being worked by Mariano Rodriguez. A fifth, smaller enterprise, the Compania La Restauradora, was also reported working the San Cayetano mine.

The 1930's

By the time that the gold price again jumped sharply in the early 1930's, a number of potentially rich gold producing areas were known and had been explored and worked to some extent. By the end of the 1920's, however, only one successful gold-mining enterprise remained on its feet, though a number of prostrate forms lay ready to be revived. The years 1914 to 1930 had not been a good time for gold-mining. In Carabaya the Inca Mining Company had ceased production in 1926 and been sold off in 1927.(1) At Aporoma the reorganised British company was struggling to find more working capital.(2) At Cochasayhuas the Cotabambas Auraria had run into severe financial crisis and lost the ore shoot.(3) At Pataz, the mining engineers Mariano Tarnawiecki and Gordon Plews had been trying unsuccessfully for thirty years to get gold mining off the ground.(4) At Andaray the workings had remained idle,(5) while at Chuquitambo the mine had been virtually abandoned.

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(1) Inca Mining Company began to run into trouble about 1909. Although Woods (op.cit.) lays emphasis mainly on the rapid increase in theft by the mine workers and engineers, it seems probable also that rising costs and stable gold prices, combined with the falling grade of the ore, were combining to make the mine less profitable. In addition, the rubber enterprise which had operated in harness with the mine until the 1912-rubber crash disappeared.(Woods). In 1914 the company was reorganised as the Inca Mining and Development Company, with Lewis Emery as the main shareholder. He proceeded to invest £200,000 in a new hydroelectric plant, and £200,000 in a new cyanide slimes plant. (Ibid.). The new cyanide plant, however, didn't work properly and the mine was worked only intermittently. (Dunn, op.cit. pp.456,489-490; Manners, F.W., Report on the Finance, Industry and Trade of Peru to October 1921, p.15). Transport became increasingly difficult as the road, which the Government had taken over about 1912, fell increasingly into disrepair; a 1920 report stated that the mine was operating at a low rate and Emery was threatening to close it down again if the road were not improved (Faith Hunter Dodge in Leader, November 13, 1920; and Leader, November 20, 1920, p.1.) In the 1920's the mine was generally a loss-maker even when operating, and Emery kept it going as 'something of a side-issue, a plaything, because of his larger interests in oil, the manufacture of oxalic acid, wheel, drugs, etc' (Dodge op.cit.). Woods agreed; Emery, she stated, enjoyed living at the mine (the setting was romantic, and as a retired multimillionaire he could afford it). Emery died in late 1924 (Leader November 25, 1924, p.1.; and December 9, 1924 p.7 for details and obituaries), and his heirs were happy to sell the mine off to Clarence Woods, although it had once again begun to

Notes to page 40 continued:

to Clarence Woods, although it had once again begun to produce during 1924 (BCIM No 117 p.85). Woods set to work

(1) to rehabilitate the mine, and brought the cyanide plant into use by adding a roasting furnace. (Woods, op.cit.; Leader, December 30, 1930, p.1). By 1930 it was estimated that the mine had produced $15 million in gold (Ibid) - an increase of only $3 million over the $12 million which had been produced by about 1910.

(2) Aporoma Goldfields Ltd. of London, as already noted, had taken over the property in 1910 and improved the old 25-km Spanish canal system. The field was worked for 13 months until April 1913; work was suspended during the war, and after the war the company found itself in debt and unable to raise working capital. (Leader, October 17, 1933, pp.22-23; Dunn, op.cit., p.486). In 1926 a reorganisation scheme made a further £24,000 capital available, and a new engineer was sent out to restart work. He found the workings caved in, however, and the water supply inadequate. (Leader, January 5, 1926, p.7; and September 3, 1926, p.11). Unable to obtain quick gold production, the company abandoned the attempt (Leader October 17, 1933, pp.22-23) and in 1927 was reconstructed as Aporoma Land and Minerals Ltd., free of its predecessor's debenture debts and interested mainly in Spanish manganese and Bolivian silver and lead (Leader, May 3, 1927, p.5; Stock Exchange Yearbook 1930, p.2055). The company's concession on the Aporoma field was evidently allowed to lapse, and a new concession was obtained in February 1931 by the Sociedad Explotadora Aporoma SA, an Arequipa businessmen's syndicate. (Leader, October 17, 1933, p.22).

(3) Cotabambas Auraria had been the largest producer of metallic gold in Peru in the early and mid 1920's (Dunn, p.174) with a small water-driven mill and amalgamation and cyanide plants. (B.O.MP. No.8, p.191 for description). A cableway between mine and mill was installed in 1927 (B.O.M.P. No.26, p.88) in an attempt to cut costs, However, the company's losses and debts mounted rapidly, while attempts to locate additional reserves of ore were unsuccessful. By early 1929 total debts were S/500,000 and the company went into bankruptcy (Leader, June 26, 1934, pp.15-16; Basadre, Historia p.4719).

(4) As already noted, the Cia Minera El Gigante had failed, after transporting the equipment for a cyanide mill into the area. In 1914 Mariano C. Tarnawiecki, an immigrant mining engineer, obtained an option on the mines and rebuilt the old mill, which he subsequently moved to Retamas (site of the later Sindicato Minero de Parcoy mill). Tarnawiecki was able to produce some small amounts of gold, but the enterprise failed financially. (Leader Trujillo Issue, 1926, p.26; and December 15, 1936, pp.14-16). Another mining engineer, the Englishman Gordon Plews, had prospected the Pataz-Parcoy district in 1910, and following the First World War he had passed the properties to the Retia Mining, Power and Railway Ltd. of London, which in 1921 was renamed Retia (Peru) Gold Mines Ltd. In 1927 the name was again changed to Peruvian Associated Gold Mines Ltd. and the company's properties at Pataz were leased to Northern Peru Mining and Smelting, which had bought up and was developing the adjacent Ganoza mines. (Stock Exchange Yearbook 1940, p.3043; Leader, December 15, 1936, pp.15-16. The Parcoy mines of the company remained undeveloped. Both Plews and Tarnawiecki published optimistic reports on the Pataz goldfields during the 1920's:

Notes to page 41 continued:

(4) (continued)

A third independent attempt to develop gold mining in the area was made at Buldibuyo, near Parcoy, between 1907 and 1919 by W.L. Morkill, the Peruvian Corporation representative in Lima at that time. Transport difficulties defeated him, and after leasing out the property for some years he transferred it to Pedro Anorga who worked it on a small scale until the 1930's. (Leader, December 22, 1936, pp.5-6).

(5) The Sociedad Aurifera de Andaray worked the Andaray gold mines from 1908 to 1916, but then abandoned the concession (Leader, September 6, 1938, p.14). The mines then remained idle until the end of the 1930's.

The only successful activity of the late 1920's was that of Northern Peru Mining and Smelting Company at Pataz; and indeed this company's activities in the 1920's were in a sense the real forerunner of the 1930's boom. Northern Peru took options on the Ganoza family's gold properties at Pataz (the most important of which was the San Francisco mine) in 1924, and hauled in a new mill and cyanide precipitation plant. This activity coincided with Northern Peru's large investment programmes in the development of the Salpo and Quiruvilca mines, and the Pataz enterprise was seen as an integrated part of the company's programme. Gold production was begun in 1926,(1) and the mines reached their peak production in the years 1930-1933, neatly compensating Northern Peru for the impact of the Depression on the Quiruvilca copper and Salpo silver mines.(2) In the late 1920's and early 1930's Northern Peru was the second gold producer in Peru (after Cerro, which produced gold as a by-product contained in its copper bars).

Although, as can be seen from Table B2, the real boom of gold output did not come until the mid-1930's, the groundwork was already being laid from 1930 on, as depreciation of the sol improved the gold price. Northern Peru, as just noted, had completed the development of its Pataz properties and brought them into full production. It was in 1930, however, that the new wave of independent gold companies began to appear. The first on the scene was the Compañía Explotadora de Cotabambas, formed in 1930

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(1) B.O.M.P. No.8, p.60; and No.26, p.8. In addition to the Ganoza interests, Northern Peru made, in 1929-1930, contracts with the Visconde de Lyrot (= Cia Minera y de Construcciones Urbanas Ltda) and with Peruvian Associated Gold Mines under which Northern Peru would exploit the mines owned by these, paying a royalty on output. (BCIM No.117, pp.67-68)

(2) Ibid., p.69. (BCIM 117, i.e.)

TABLE E1

Gold-Mining Companies of the 1930's

Year established	Name of company	Capital	Directors
1930	Compania Explotadora Cotabambas	S/30,096,000 in 1935 Written down to S/6m in Feb 1938.	1935: Fernando Wiese Augusto N. Wiese Others n.a.
	Took over functioning mine 1930.		
1931	Compania Aurifera Nazca	S/2.5m(1935)	1935: Fernando W iese (P) Carlos Alvarez Calderon (MD) Alfredo Alvarez Calderon Hector Boza Eulogio Fernandini Jorge Felix Remy
	'Sol de Oro' mine near Nazca entered production 1936.		
1931	Sociedad Anonima Exploradora Nacional	S/10,000	1935: Eulogio Fernandini C. (P) Fernando Camino Mariano C. Tarnawiecki C. Rospigliosi C. J.F. Remy (M)
	Bought out Tarnawiecki's control of the old 'El Gigante' property at Parcoy. Reorganised to form Sindicato Minero de Parcoy (see below).		
1931	Compania Aurifera Inambari	S/5m	1935: Alfonso J. Alvarez Calderon Alfredo Hohagen Diez Canseco Clarence Woods
	Placer deposits in Sandia and Carabaya. Not a big producer.		
1932	Compania Aurifera Pablobamba SA	S/10,000	Sixto Gutierrez (P & MD) Eduardo Ganoza y Ganoza Eloy Cubas Roberto Blume Augusto Ratti
	Placer properties in Sandia.		

2 Compania Minera Pullani Ltda S/40,000 n.a.

Mining properties in Sandia.

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33 Compania Minera del Peru SA S/50,000 1935
Ricardo Guzman Marquina
Carlos Badani
Placido Gonzales Prades
Antonio Rodriguez Ramirez

Mining pro erties in Pallasca province (Ancash)

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33 Sociedad Minera Alvarado Valderrama y Cia S/20,000
Juan F. Araujo
Nicolas Icaza
Oscar A. Alvarado
Felix Valderrama
Ricardo Palma S.

Mining properties in Dos de Mayo (Huanuco)

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933 Sociedad Explotadora Aporoma SA S/500,000 (1933) 1933
250,000 (1935) Sixto Gutierrz (MD)
E.U.P. Fitzgerald
D. Francisco G. de la Torr
Alfredo Hartog
Gustavo de la Jara
Luis Emilio de Olazabal
Manuel Ugarteche
Simon Yriberry

1935
Sixto Gutierrez (MD)
Ernesto Sboto
Diomedes Arias Schreiber
Eloy Cubas
Augusto Ratti

Took over the old A oroma placers. In production by 1941.

1933 Compania Auriffera San Luis S/1.2m 1935
Felipe Alvarez Calderon
Benjamin Cresci
Henry John Hammond
E.A. MacCormack
Hernando de Lavalle (?*)
H.L. Woodhouse (M)

Gold mine in Lucanas province (Ayacucho). Leased the pro erty to San Luis Gold Mines (see below) in 1936.

1933 Compania Minera Alpacay S/1.2m 1935
Fernando Wiese (P)
Salvador Scuto (M)
Pedro Vaccari (1940's)

Mine in Condesuyos province, Arequipa. Began production 1938.

1933 Compania Minera Nacional SA S/4m 1935
Benjamin Cresci (P)
Cesar Gonzalez Larranaga (VP

Carlos Salazar S. (MD)
Ramon Aspillaga
Ernesto Ayulo Pardo
Eulogio Fernandini C.
Gio Batta Isola
Gino Salocchi
Waldemar Schroder
Harold M. Smith (M)

1938
Ramon Aspillaga (P)
C.G. Larranaga (VP)
Carlos Salazar S. (MD)
Ernesto Ayulo Pardo
Eulogio Fernandini C.
Gino Salocchi
Waldemar Schroder
Eugenio Isola
Victor P. Rocca

1942
Pedro V. Rubio (P)

Mine at Huachon in Pasco province. Production began 1936.
Closed down 1942.

33/4	Andaray Gold Mining Syndicate	na	na

Took over Andaray gold mines, formerly owned by Sociedad Aurifera de Andaray. Leased the mines to Andaray Gold Mines Co (see below).

34	Sociedad Lavaderos del Chimchipe	S/100,000	Charles F. Fritz (P) Elmer J. Faucett T.A. Lewis G.J. Leavy T.W. Mather (M)

Gold placers in Jaen province. Didn't succeed.

934	Carabarcuna Mining Company	S/1,000	1935 A. Othick Antenor Fernandez Soler R.R. Reed

Mine property in Sandia.

1934	Compania Aurifera Santa Fortunata Ltda	S/150,000	1935 shareholders Manuel T. Mercado Humberto Solari Hurtado Andres Gaggero Luis Solari Hurtado Arturo Rodriguez Miranda

Mine property in Sandia.

934	Compania Aurifera Oro Vilca	S/2,000	1935 socios Jorge B. Garcia Alejandro A. Montoya P.A. Gonzalo Caso F.

Mines in Huamalies province (Huanuco)

934	Compania Aurifera Islay Ltda SA	S/120,000	1935 Fernando Wiese (P) Ernesto Magnani Hernando de Lavalle A. Lamond C.A. Carrol Waldemar Schroder

Mine in Islay province (Arequipa)

1934	Compania Aurifera Ayahuay	S/2.1m	1935 Fernando Wiese Hernando de Lavalle Fortunato Marin

Mines in Antabamba provinee (Apurimac)

1934	Compania Aurifera Buldibuyo Ltda	S/1m (1934) S/2.5m (1936)	1935 Ernesto Magnani Guillermo Boza Eulogio Fernandini C. Pedro Andres Anorga Hernando de Lavalle
		S/12m by 1954	1954 Hector Boza (P) Pedro A. Anorga Guillermo Boza Eulogio Fernandini C. Jorge Pflug Jorge G. Velaochaga
		S/12m (1962)	1962 Hector Boza (P) Guillermo Boza Pedro A. Anorga Eulogio Fernandini C, Jorge Pflug Jorge G. Velaochaga

Mines in Pataz province. Began production 1936.

1934	Compania Aurifera Saramarca	S/12,450,000	1935 E.A. MacCormack (P) Carlos Salazar Southwell C. Althaus F. Alvarez Calderon H. Waldemar Schroder Cesar Gonzales Larranaga Conrado Rey

cont

Cia Aurifera Saramarca cont — E.N. Palacios

Mines in Ica. Production began 1936.

1934/35? San Luis Gold Mining Company — $700,000

1938
M.J. Heller (P) (USA)
Leon J. Rosenshine (M)
W.J. Spalding
Andres F. Dasso
J.M. Price (=Union Carbide)
C.B. Lihme.(USA)

$740,000 (1941)

1941
M.J. Heller (P)
L.J. Rosenshine (MD)
W.J. Spalding
Aurelio Garcia Sayan
Andres Dasso
J.M. Price (NY)
C.A. Prentis (NY)

Took over mines of the Compania Aurifera San Luis (see above) and Sandicato San Luis (see above)
Production started 1938.

1935 Sindicato Minero Julcani SA — S/10,000 (1936)

1935 shareholders
Ernesto Magnani
Enrique Ayulo Pardo
Bernardo Pellny
Hernando de Lavalle

Syndicate dissolved 1936; mines taken over by Sociedad Minera Suizo-Peruana Julcani.

1935 Compania Aurifera Tambo SA — S/10,000 (1935)

1935
Enrique Mogrovejo
Mariano Mogrovejo
Genaro M. Saavedra
Roberto G. Cornejo
Toribio Hernandez Mesia

Mines in Islay province (Arequipa)

1935 Compania Aurifera Vilcabamba — S/99,000 (1935)

1935
Jose Quezada (P)
Luis Alayza y Paz Soldan
Oscar Berckemeyer
Eduardo Rodrigo y Cia
Mariano Espejo
Clemente Althaus
Juan Francisco Pazos Varela

Properties in Antabamba (Apurimac)

1935 Compania Aurifera Gold Sand S/15,000 (1935) na

Placers in Santa province (Ancash)

1935 Compania Aurifera Benditani SA S/500,000 (1935) 1935
Rollin Thorne
Waldemar Schroder
Alberto Quezada
Tomas A. Lewis
Alberto Lamond
C.M. Carroll (Br, ?Milne)
H. Griffin

S/780,000 paid by 1937

Mines in Carabaya (Puno)

1935 Compania Aurifera La Estrella S/2,350,000 1935
Augusto N. Wiese
Pedro Garcia Gastaneta
Fernando Wiese

Mines in Lima province

~~1936 Sociedad Minera Nizo-Peruana S/2m (1936)~~

1935 Compania Aurifera Jaqui SA S/7,200 1935
Teobaldo J. Pinzas
Mario A. Coppo
Demetrio Watson
Enrique Garcia

,Mines in Caraveli province (Areuipa)

1935 Pallasca Aurifera SA S/250,000 na

Mines in Pallasca province

1935 Sindicato Minero de Parcoy S/5m (1935) 1935
Eulogio Fernandini C. (P)
Hector Boza
Ernesto Magnani
Hector Marisca
Jorge Felix Remy (MD)

Mines at Parcoy taken over from former Sociedad Anonima Exploradora Nacional (see above). Production began 1936.

1936 Sausac Auraria SA S/400,000 1935
Armando Castaneda Izaga
Victor Congrains
Jose de la Rosa Llosa
Alberto Hoefkin
Cesar del Rio

Mines in Huamalies province (Huanuco)

1936 Compania Minera Aryabamba SA S/2m

1935
Manuel Augusto Olaechea
Felipe Beltran
Manuel Barnechea
Ernesto Ayulo Pardo
A. Rizo Patron A. (M)

1937
M.A. Olaechea
Felipe Beltran
Francisco Echenique
Manuel Barnechea
Mariano Tarnawiecki
Antenor Rizo Patron
Carlos Thorndike

Mine in Pataz province. Production began 1937.

1936 Sociedad Minera Suizo-Peruana Julcani S/2m

1936
Carlos Petersen (P)
Fernando Oeschle
Edwin Rudolph
Pablo G. Vidalon
Bruno Tschudi (MD).

Took over Sindicato Minero Julcani (see above) mine near Lircay. Production began c 1938. Paid up capital S/3.3m by 1941.

1937 Andaray Gold Mines Company $200,000

1937
Mark Rascovich (p)
L.J. Rosenshine

1944
W.J. Spalding (P)
L.J. Rosenshine (MD)
M.J. Heller (NY)
W.H. Vander Poel (NY)
Edward F. Smith (NY)

Mines leased from Andaray Gold Mining Syndicate (see above). Production began 1938. Closed in late 1960's.

1937 Compania Aurifera Anglo-Peruana Parcoy SA S/2.5m

1937
Frederick J. Milne (P)
Ricardo Bentin (VP)
Oscar Berckemeyer
Carlos Ferreyros
Alec Howard
C.N. Carroll
A. Gordon Plews
Gustavo Aspillaga (MD).

Took over Peruvian Associated Gold Mines' properties at Parcoy. Development work 1937-38 , but not brought into production.

1937/38 Compania Aurifera Caraveli ~~$~~ na Boza family

Calpa mine began production about beginning of 1939. Huacchoc mine opened 1939. Merged into Consorcio Minero Peruano 1943 (see below).

1938 Carmen Chabuca Mining Company na Rosenshine group

Placers in Puno. Production begun c1939.

? Compania Aurifera Chala)
? Compania Aurifera Otoca) incorporated 1943 into Consorcio Minero.
? Compania Aurifera Los Incas)

1943 Consorcio Minero Peruano S/16m

Merger of Cia Aurifera Nazca, Cia Aurifera Caraveli, Cia Aurifera Chala, Cia Aurifera Otoca, Cia Aurifera Los Incas. Main mine the Calpa mine of Cia Aurifera Caraveli.

1946 Capitana Gold Mines Company $1,430,000 Rosenshine

Mines in Chala province , production began 1946-47.

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by Fernando Wiese of Lima to take over the bankrupt Cotabambas Auraria.(1) Wiese refinanced the enterprise with the assistance of his brother Augusto, and began a massive programme of mechanisation and new exploration in the mine. The company made history in 1933 by hiring a Panagra plane to airfreight in 60 tons of equipment for its new hydro-electric plant to an airfield built at Huanucopampa, 28 kilometres from the mill site.(2) The investment programme was initially successful, and other Peruvian capitalists began to follow the Wiese brothers' example. Table E1 lists the new goldmining companies of the 1930's in order of their establishment, together with data on their capitalisation and boards of directors, and the year in which they first began production. The picture is a striking one.

In the first place, the number of companies attracts notice. Table E1 (which is by no means a complete listing) shows the following numbers of new enterprises year by year:

1930	1
1931	3
1932	2
1933	7
1934	9
1935	9
1936	3
1937	3
1938	1
	38

Clearly, the real boom years for initiation of gold enterprises were 1933-1935, the period immediately following the Peruvian and US abandonment of the gold standard. Not all of the enterprises listed, of course, were serious, nor were all successful. Several were fly-by-night affairs which never raised the necessary capital to begin development of their properties; still others fell victim to economic miscalculation. Of the 38 firms established between 1930 and 1938, five were 'successor' companies in the sense that

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(1) Leader July 25, 1933, p.13; and June 26, 1934, pp.15-18.

(2) For reports and photos see Leader, June 20, 1933, p.19; and June 26, 1934, pp.15-18.

TABLE E2

Production of Gold by Company: Kilos fine

Year	Peru total	Cerro smelter output	Cerro company ores	Northern Peru Mining	Inca Mining	Cotabambas Asaraia
1903	1,078					
1904	601					
1905	777					
1906	1,247	4				
1907	778	16				
1908	997	41				
1909	554	176				
1910	708	347				
1911	741	369				
1912	1,435	933				66
1913	1,429	778				156
1914	1,540	718	101			239
1915	1,591	747	89		165	256
1916	1,907	912				264
1917	1,887	920				428
1918	1,793	869				454
1919	2,029	852	78			645
1920	1,952	821	100		=	585
1921	2,407	1,296				521
1922	2,533	1,214				454
1923	3,744	1,938				-
1924	3,700	1,093				674
1925	3,420	1,738		456	137	461
1926	2,860	1,395		712	-	99
1927	2,878	925		796	-	476
1928	2,193	1,044		437	61	89
1929	3,734	1,034		973	235	656
1930	2,766	911		2,070	297	289
1931	2,494	906		1,943	200	287
1932	2,678	388		860	179	544
1933	3,010 2970	642		820	225	590
1934	3,075	706	483	866	273	468
1935	3,451	891		1,032	121	-
1936	4,740	1,412	317	926	121	186
1937	7,587	1,605		755	89	498
1938	8,097	2,331				
1939	8,316	2,451	na	na	na	
1940	8,748	2,563				
1941	8,870	2,512		375	163	230
1942	8,013	2,191	746	238	99	222
1943	6,209	1,483		52	27	278
1944	5,449	1,524	848	465	6	235
1945	5,370	1,684	860	59	8	249
1946	4,926	1,332	692	117	32	258
1947	3,608	1,007	768	31	6	173
1948	3,458	506	481	79	..	109
1949	3,538	841	349	58	-	98
1950	4,602	1,139	735	55	-	77
1951	4,923	1,480	789	54	-	107
1952	4,195	1,363	880	60	-	38
1953	4,017	1,385	466	61	-	-
1954	4,681	1,407	695	68	-	-
1955	4,784	1,880	631	69	-	-
1956	5,189	1,623	602	130	-	-
1957	5,025	1,818	868	104	-	-
1958	5,004	1,390	811	122	-	-
1959	4,678	1,275	814	98	-	-
1960	4,362	1,526	643	93	-	-
1961	5,466	1,353	1,333	94	-	-
1962						
1963		1,227		95		

	Minero Parcoy	Aurifera Buldibuyo	Aurifera Alpacay	Aurifera Saramarca (from 1943 Cia Aurif. Consolidada)	Minera Nacional	Aurifera Nazca
1903						
1904						
1905						
1906						
1907						
1908						
1909						
1910						
1915						
1920						
1925						
1930						
1931						
1932						
1933						
1934						
1935						
1936	17			227	247	410
1937	595	138		535	623	602
1938						
1939						
1940						
1941	757	475	479	592	240	507
1942	825	534	350	720	3	376[a]
1943	757	691	294	479	-	[a]
1944	567	603	361	21	-	
1945	354	634	434	-	-	[a]
1946	296	670	393	-	-	
1947	367	490	350	-	-	
1948	319	441	261	-	-	
1949	230	456	211	-	-	
1950	410	572	174	-	-	
1951	561	432	172	-	-	
1952	381	461	-	-	-	
1953	482	392	-	-	-	
1954	601	317	-	-	-	
1955	630	290	-	-	-	
1956	565[b] (495)	341[b] (300)	-	-	-	
1957	513[b] (508)	315[b] (308)	-	-	-	
1958	412[b] (365)	284[b] (278)	-	-	-	
1959	228	224	-	-	-	
1960	103	256	-	-	-	
1961	-	332	-	-	-	
1962						
1963	-	131	-	-	-	

a. This company's Calpa mine was incorporated into Consorcio Minero in 1943; the Sol de Oro mine in Nazca had also been incorporated by 1945.

b. For these years, content of precipitates rather than gold bars - the statistics for these years use the precipitate content rather than bars content in totals. The pencilled insertions show gold bars production for these companies; and pencilled totals on p.1. show effects of correcting the totals to gold-bar content as in other years.

Gold Production by Companies: 3, Consorcio Minero mines.

Year	Calpa	Huacchoc	Los Incas	Sol de Oro	Caraveli	Total
1903						
1905						
1910						
1915						
1920						
1925						
1930						
1935						
1940						
1941						
1942						
1943	251	-	-	285		536
1944	242	104	1	221		568
1945	313	6	239	-	-	558
1946	240	-	166		254	660
1947	267	-	-	-	-	267
1948	472	-	-	-	-	472
1949	346	-	-	98	-	444
1950	437	-	-	115	-	552
1951	343	-	-	38	-	381
1952	307	-	-	-	-	307
1953	261	-	-	-	-	261
1954	588	-	-	-	-	588
1955	709	-	-	-	-	709
1956	899[b] 233	-	-	-	-	899
1957	949[b] 288	-	-	-	-	949
1958	1,046[b] 320	-	-	-	-	1,046
1959	441	-	-	-	-	441
1960	711	-	-	-	-	711
1961	631	-	-	-	-	631
1962						
1963						

Gold Production by Companies: 4. Rosenshine mines.

Year	San Luis Gold Mines	Capitana Gold Mines	Carmen Chabuca	Andaray Gold Mines	Castrovirreyna Metal Mines	Volcan Mining Coy	Cajabamba Minin & Millin
1903							
1905							
1910							
1915							
1920							
1925							
1930							na
1931							8
1932							6
1933							26
1934							9
1935						122[c]	11
1936			75			47[c]	15
1937							
1938							
1939							
1940				174	-	-	-
1941	701	-	..	163	-	-	-
1942	666	-	..	133	-		
1943	399		11	213	45	-	
1944	348		8	266	77	129	
1945	332		..	203	74	132	
1946	413			188	123	110	
1947	316	81		135	84	64	
1948	412	460		125	..	78	
1949	345	487		201	100	38	Tangana Mines Ltd
1950	379	512		256	49	16	
1951	341	520		260	48	15	
1952	392	536		361	80	40	[illegible]
1953	272	508		335	65	35	..
1954	274	438		325	118	..	
1955	370[b]	338[b]		308[b]	116	..	1
1956	385[b] 348	271[b] 257		369[b]	103	38	..
1957	367[b]	43[b] 41		301[b] 266	91	..	..
1958	341	-		268	130	59	-
1959	340	-		281	131	52	
1960	261	-		347	113	51	
1961	168	-					
1962				172	83	43	
1963	-	-					

Gold Production by Companies: 5.

Year	Rosenshine totals	Cia de Minas del Peru (Sucuitambo)	Cia Minera Posco	Cia San Juan de Lucanas	San Antonio Esquilache (Williams/ Cia Minera del Peru)	Cia Minera Caylloma
1903						
1905						
1910						
1915						
1920						
1925						
1930						
1931						
1932	8					24
1933	6					23
1934	26					30
1935	9					47
1936	133					59
1937	137					86
1938						
1939						
1940						
1941	875				4	43
1942	829				13	38
1943	543				12	32
1944	614				52	34
1945	804				23	33
1946	822				10	33
1947	818				20	27
1948	1,155	34			25	9
1949	1,035	-			13	20
1950	1,230	134		-	7	39
1951	1,182	184		96	12	29
1952	1,251	284		175	15	38
1953	1,261	405	-	203	22	38
1954	1,147	334	195	266	36	40
1955	1,151	410	160	222	41	43
1956	1,081	357	169	445[b] 254	36	50
1957	920	340	166	179[b] 11	27	46
1958	733	175	256	452[b] 56	9	44
1959	797	210	288	526	7	39
1960	725	221	251	300	15	47
1961	679	242	229	142	17	70
1962						
1963	298	-	192	153	13	53

Gold Production by Companies: 6.

Year	San Antonio de Poto	Lavaderos	Soc Aur. Aporoma	Soc Min. Suizo-Peruana Julcani	Cia Aur. Caraveli	Cia Min. Inambari (incl Montebello)	Cia Min. Atacocha
1903							
1905							
1910							
1915							
1920							
1925							
1930							
1931							
1932	62	326					
1933	36	380					
1934	40	576					
1935	41	1,200					
1936	17	1,200					
1937	25	1,125					
1938							
1939							
1940							
1941	d	1,258	8	459	265	27	39
1942	d	1,091	17	304	237	106	45
1943	21	895	21	288	-	31	48
1944	15	594	9	251		-	65
1945	d	716	..	59	Cia Minera		45
1946	d	376	..	..	Condoroma		44
1947		208		..			48
1948		110		10			59
1949		64		..			39
1950		86		13			111
1951		71		86			98
1952		70		12			112
1953		100		-			105
1954		100		-			112
1955		100		-			125
1956		100		-	-		149
1957		100			48		147
1958		100			50		146
1959		100			66		120
1960		100			96		121
1961		100			99		147
1962							
1963					40		136

Sources and Notes:

Total output series up to 1934 from BCIM 117 (1935 Statistics) p.48. 1935-1950 from Anuario de la Industria Minera 1951 p.111. 1950-1963 from Anuario de la Industria Minera 1963, p.75.

Cerro smelter output 1906-1934 from BCIM 117, p.215. 1935-1941 from Anuario 1942, p.80.(Note that this reference gives a series back to 1907 which differs slightly from that in BCIM 117). 1932-1937 revised using annual data in the detailed tables of output by company. 1941 on drawn from these detailed tables in the annual statistics.

Cerro own ores 1934 and 1936: Oroya total output minus total gold content of purchased customs ores (this understates Cerro slightly, because of no allowance for wastage). Custom ores from BCIM 112 (1934 Stats) pp.10-11; and BCIM 118, pp.75-80. Ounces converted to grammes at 31.1.

Northern Peru 1925-1936 from BCIM 118 ('El Oro en el Peru') pp.97 & 105. Thereafter from detailed tables in annual statistics.

Cotabambas 1912-1934 from BCIM 118, p.113; and Inca Mining 1925-1936 from Ibid., p.122. Later years from annual volumes.

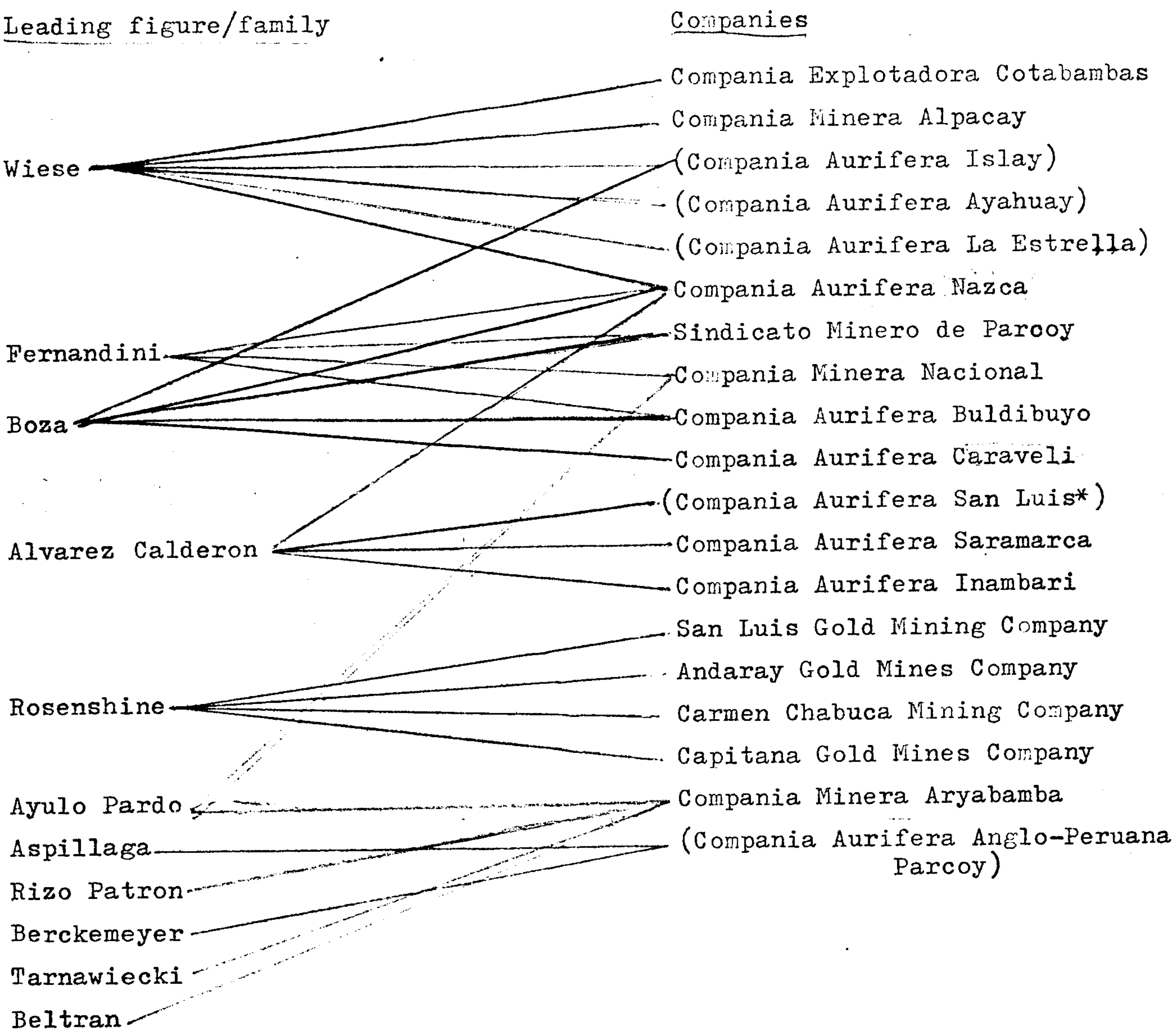
Detailed annual figures drawn from:

BCIM 111, pp.18-26; 112, p.3; 118, pp.40-41 &44-47; 117, pp.46-47; [illegible]

Anuario de la Industria Minera 1942, pp.28-29; 1944, pp.42-43; 1945, pp.62-63; 1946, pp.36-37; 1947, pp.58-59; 1948, pp.72-73; 1949, pp.114-115; 1951, pp.113-114; 1952, pp.111-112; 1953, pp.113-114; 1954, pp.103-106; 1955, pp.92-94; 1956, pp.89-93; 1957, pp.87-91; 1958, pp.92-95; 1959, pp.84-87; 1960, pp.72-75; 1962, pp.70-73; 1963, pp.26-29 (concentrates only).

TABLE E

Gold-Mining Enterprises of the 1930's-mid 1940's grouped



they took over properties from earlier owners. This was true of the Cia Explotadora Cotabambas; of San Luis Gold Mines; of sindicato Mineromde Parcoy; of Andaray Gold Mines Co; and of the Sociedad Minera Suizo-Peruana Julcani. (The last four of these all took over from firms whose earlier establishment is included in Table E1). The number of actual mines involved in Table E1, thus was 33 ratherthan 38. Of these 33, about half became producers at some stage, though not all successfully; and about 13 could be counted success stories.

Table E2 sets out the production record of the principal Peruvian gold producers since 1903. The new companies of the 1930's boom which figure there are the following:

Sindicato Minero de Parcoy
Compania Aurifera Buldibuyo
Compania Aurifera Alpacay
Compania Aurifera Saramarca
Compania Minera Nacional
Compania Aurifera Nazca
Sociedad Minera Suizo-Peruana Julcani
Compania Aurifera Caraveli
Compania Minera Inambari
San Luis Gold Mines
Andaray Gold Mines
Sociedad Aurifera Aporoma (very small production).
Carmen Chabuca Gold Mines (" " ").

Of 54.1 tons of gold produced in Peru from 1941 to 1950, these thirteen companies accounted for 29 tons, or around 53%. During the period 1937 to 1945 their share of output was considerably larger (unfortunately we do not have full data for 1937-1940 available to us at present).

Taking the thirteen companies listed above and referring back to Table E1, it can be seen that the enterprises fall into a series of groups, the most important of which may be distinguished as the Wiese group, the Fernandini group, the Boza group, the Alvarez Calderon group, and the Rosenshine group. These groups,

obviously, overlap in certain cases. The breakdown is shown in Table E3. The Wiese, Rosenshine and Alvarez Calderon groups emerge as relatively independent, while the Fernandini and Boza interests show several overlaps. All the four main Peruvian groups came together in the Compañía Aurifera Nazca, and subsequently in the Consorcio Minero Peruano formed in the early 1940's by a merger of several companies, the most important being Nazca and Caraveli.

At the bottom of Table E3 appear a few of the other Peruvian capitalists who participated, though less prominently, in the new wave of companies. These had the misfortune to be involved in generally unsuccessful ventures. The Aspillagas and Ayulo Pardos were in Fernandini's Compania Minera Nacional, which went bankrupt in the 1940's, and each was also involved separately in an unsuccessful venture - the Aspíllagas in the ill-fated Compania Anglo-Peruana Parcoy, the Ayulos in the short-lived Compania Minera Aryabamba.

Some summary company histories serve to illustrate the pitfalls as well as the successes of the new sector.

As was noted earlier, the Buldibuyo gold mines near Pataz had been worked sporadically by W.L. Morkill of the Peruvian Corporation until 1919, then leased briefly, and then (about 1921 or 1922) taken over by Pedro Anorga. Anorga installed a 12-ton Hardinge mill and a small hydro-electric plant, and operated successfully on a small scale until 1933, when the rising gold price attracted the interest of various Lima operators.(1) In August 1934 Anorga brought in as partners a number of Lima capitalists in order to finance development, by the formation of the Compania Aurifera Buldibuyo. The initial capital of the company

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(1) F.P. Farrar, 'Gold Mining in the Buldibuyo Region', in Leader, December 12, 1936 pp.5-6.

was S/1m, in S/10 shares. Of the 100,000 shares, 49,000 were designated 'A' shares and were issued to Pedro Anorga in payment for the mining property and installations, while the remaining 51,000 'B' shares were issued at par to finance development. The following year a further 100,000 'B' shares were issued, bringing capital to S/2m; and in 1936 and 1937 further issues of 50,000 'B' shares were made, bringing total paid-up capital to S/3 million, of which S/2.5 million represented actual cash raised. Thereafter the company was self-financing, and periodic writing-up of its book value, with corresponding free share issues to the shareholders, brought total capital up to S/12 million by 1947, a figure at which it remained for the following twenty years.(1)

The most important source of finance for the new company seems to have been the Banco Italiano (Banco de Credito). A 1935 report describes the enterprise as having been 'financed largely by Italian interests in Lima'(2), and the first board of directors included Ernesto Magnani, the Manager of the Banco Italiano.(3) Alongside this vital financial backing, Añorga brought in two of the most competent and well-connected mining entrepreneurs of the 1930's; Hector Boza (famous in the early 1920's for his 'La Guardia' silver mine at Salpo) and Eulogio Fernandini Clotet, the son of Eulogio E. Fernandini who had been operating at Colquijirca since the 1880's. Fernandini and Boza were well-connected in the elite and brought with them valuable political influence as well; Boza was Benavides' Minister of Fomento through most of the 1930's and among other things was responsible for initiating construction of the road from Huamachuco into the Pataz region. Looking back to

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(1) Vademecum del Inversionista 1954-55 p.454-455; and 1962-63,p.508.
(2) Leader, February 12, 1935, p.14.
(3) Leader, March 3, 1936 p.22, and March 2, 1937.

Table E3 it is also apparent that the Fernandini-Boza partnership tied the Buldibuyo company in with a number of other successful gold ventures - notably the neighbouring Sindicato Minero de Parcoy, 18 km from Buldibuyo.

In addition to the participation of the Boza and Fernandini families (and probably partly as a result) the new company obtained as its first manager an experienced US mining engineer, John T. Glidden, who had been active in Peru since the early 1920's, and had worked for several years for Cerro.(1)

Before the Buldibuyo company began work, the only successful large-scale gold mine development in the region had been that of Northern Peru Mining and Smelting at Pataz. Access was still confined to mule trails and a cable over the Marañon; there was no road beyond Huamachuco, and air transport into the region was not established until 1936. From the end of 1934 through to early 1936 the company hauled in its equipment over the 135-km trail from Huamachuco, using mules, oxen and manpower. A 150hp hydroelectric plant was installed, and a 100-ton capacity mill. By early 1936 construction of the mill was underway, and full-scale production began at the beginning of 1937.(2) Within two years the company was paying a 12.5% dividend, on its share capital of S/3 million. By 1943 the dividend rate was up to 30%. In 1947, an exceptional year for the gold companies (due to the establishment of the gold certificate system by the government) the dividend rate reached a peak of 70% on share capital of S/12 million, only S/3 million of which corresponded to actual funds or resources committed by shareholders (the

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(1) Farrar, op.cit.

(2) C. Carleton Semple, 'Peru's Gold-Mining Industry Grows' in Engineering and Mining Journal December 1936; Leader, January 5, 1937, Supplement p.iii.

remainder represented capital distributions).[1] From the mid-1940's, however, there was an underlying downward trend in profitability, as rising costs pressed against a fixed gold price. Profits fell sharply in the early 1950's, and in 1957 the company reported a loss (due partly to a sharp increase in depreciation and depletion allowances). This decline in profitability was accompanied by a steady fall in the company's share of total Peruvian gold output, from 12% in 1949 to only 4.8% by 1959.[2] In the late 1950's and early 1960's, however, the situation improved, dividends were resumed and the company's share of gold output recovered to 7.8% in 1961. A lead-zinc-silver mine at Jangas, where claims had been staked in 1956, provided the company with the possibility of moving out of gold into other metals.[3]

Along the way, the company had already been diversifying its interests. In 1943 S/700,000 was invested in the establishment of the Compania Minera Tarica, to work mines in Anash formerly owned by the Empresa Minera San Juan.[4] This company became a significant silver-lead-zinc producer during the 1950's, contributing to the Buldibuyo company's income. A further S/100,000 was invested in the early 1940's in the already-existing Compania Minera La Estrella, but development of this mine was not pushed through after initial exploration work.[5]

The Buldibuyo company last appeared in the production statistics in 1963, in which year the mine was evidently closed.

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(1) Vademecum 1943-44 p.284, and 1950-51 p.424.
(2) Vademecum 1962-63 pp.505 & 509.
(3) Ibid., p.506.
(4) Vademecum 1950-51, p.424.
(5) Ibid.

F. The Rise of Lead and Zinc

In recent Peruvian mining history lead and zinc have tended to be bracketed together, reflecting the fact that they occur together in many of the main deposits, as well as the common practice of grouping them together in the world market. It is as well, therefore, to begin by noting that prior to the 1930's the two metals had had very different histories in Peru. Lead had been included among the principal products of the mining sector since the Colony, while zinc had become of economic interest only during the 1920's when Cerro first began the production of zinc concentrates in the flotation concentrator at Casapalca. Two key factors account for these differences: firstly, lead could be recovered direct from the ore by standard smelting processes, while zinc required electrolytic refining from the concentrates; and second, lead frequently occurred with silver in the Peruvian deposits, and had consequently been a common by-product of silver smelting. In particular, the wave of smelter construction during the 1880's and early-mid 1890's in Peru (before copper became the centre of attention) had focussed upon the production of silver-lead bars from the ores around Cerro de Pasco, Yauli, Casapalca, Hualgayoc, the Ancash mines, and various other areas.(1) A number of the independent smelters survived until the end of the First World War, and a couple (the Vesuvio and Pompei companies in Ancash) remained in operation through to the 1930's and 1940's, before switching from smelting to concentration; the Vesnvio smelter in fact remained in operation until 1959.(2)

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(1) See Purser, W.C.F., Metal Mining in Peru, Past and Present, pp. ; and M. Samame Boggio, La Mineria Peruana.

(2) Anuario de la Industria Minera 1959, p.140.

Table #1

Peruvian Lead Production, 1903-1972: Metric tons content.

Year	Final output	Mineral/ concentrates output	Cerro mines	Other mines
1903	1,302			
1904	2,209			
1905	1,476			
1906	2,569			
1907	5,525			
1908	2,633			
1909	2,093			
1910	1,866			
1911	2,209			
1912	4,050			
1913	3,927			
1914	3,148			
1915	2,696			
1916	2,038			
1917	1,271			
1918	632			
1919	1,066			
1920	562			
1921	518			
1922	709			
1923	686			
1924	843			
1925	3,484			
1926	10,326			
1927	5,220			
1928	16,688			
1929	21,420			
1930	19,774			
1931	2,643			
1932	4,600			
1933	1,953			
1934	9,102	10,332	4,876	5,456 4,456
1935	28,545		7,720	20,825
1936	30,198		8,177	22,021
1937	42,038		7,680	34,358
1938	58,044			
1939	46,283		7,279	39,004
1940	50,439			
1941	50,047		9,846	40,201
1942	44,881		7,036	37,845
1943	47,810		7,053	40,757
1944	52,501		9,043	43,458
1945	53,664		5,005	48,659
1946	44,518		6,542	37,976
1947	54,814		9,162	45,652
1948	48,538		14,035	34,503
1949	65,357		16,097	49,260
1950	62,118		19,732	42,386
1951	82,350		21,543	60,807
1952	95,773		21,037	74,736
1953	114,580	109,238	28,778	80,460
1954	110,066	117,457	30,058	87,399
1955	118,751	126,073	34,319	90,754
1956	129,075	132,537	29,318	103,219
1957	137,152	150,599	34,966	115,633
1958	134,162	136,722	32,201	104,521
1959	115,215*	127,163*	30,809*	96,354
1960	131,630	139,436	32,212	107,224
1961	136,908	147,835	35,746	112,089

Table F1 Continued

Year	Final output	Mineral/ concentrates output	Cerro mines	Other mines
1962	133,377	139,616	34,294	105,322
1963	149,197	145,934	42,047	100,887
1964	150,674	150,477	51,163	99,314
1965	154,344	157,480	49,519	107,961
1966	161,521	165,000	54,100	110,900
1967	159,716	160,000	52,300	107,700
1968	154,524	150,365	52,323	98,042
1969	154,543	154,543	48,012	106,531
1970	156,770	151,185	46,632	104,553
1971	165,814	156,218	46,067	110,151
1972	184,381	177,539	57,411	120,128

Sources and Notes:

The series for final output are the historical series (incorporating revisions both specified and unspecified) published in the mining statistics. The following versions have been taken:

1903-1922 from BCIM No 107, p.30.
1923-1939 from Anuario Minero 1948 p.130.
1940-1960 from Anuario Minero 1963 p.101.
1961-1972 from Anuario Minero 1972 p.36.

The figures for mineral/concentrates output are really available only from 1956 onwards; prior to that date the published statistics did not provide totals other than those of final output. For 1953-1955, the total output series net of stocks changes has been taken as a proxy for mineral/concentrates output. It might be possible to put together estimates from the detailed data in the statistics from 1941 on, but the effort involved did not appear justified, as the difference between final output and mineral/concentrate output is not very great (accounted for mainly by wastage in refining, and stocks changes). For 1953-1972, the figures are taken from the annual volume for each year, i.e. they are unrevised.

Cerro mines output is from the detailed data in Table F3, drawn from the detailed annual statistics. Figures for the 1920's are not available in England.

'Other' output is simply the total minus Cerro output. Up to 1953 the final-output total is used (perforce). Thereafter, the minerals/concentrates total is used. The error, if any, will tend to bias the 'other' series downward 1934-1952, since the final-output total tends to be less than the minerals/concentrates total.

* Switch from assay to recoverable content.

History of Lead

Table F1 and Figure F1 trace the evolution of Peru's lead production since the beginning of the century. It will be seen that growth has proceeded in a series of spurts, separated by periods of stagnation or decline. The late 1910's saw a steady fall in production, which was reversed during the second half of the 1920's when Cerro entered lead production at Oroya. The Depression brought a severe setback, but by 1935 production had recovered to above the 1920's peak, and rapid growth continued until 1938. There followed a decade of stagnation during the 1940's, ended by the beginning of a new burst of growth in 1949. The expansion of the 1950's was of unprecedented magnitude, with total output increasing three times between 1948 and 1957, encouraged by high prices (the result first of Korea, and subsequently of US strategic stockpiling and buoyant markets). 1958 brought this growth to an abrupt half, as the USA imposed new restrictions on lead and zinc imports, and the industrialised economies entered upon a recession which continued into the early 1960's. Peruvian lead production recovered and again began to expand during the mid-1960's, but fell back again after 1966, as several mines became exhausted, the local economy experienced economic problems, and the investment climate became uncertain for both Peruvian and foreign capital. 1972 brought a new surge of expansion.

Lead production up to the end of the 1910's was associated with silver mining, and it was the decline in independent (non-Cerro) silver production which accounts for the fall in lead output (although the exhaustion of an accumulated stock of old lead-rich slag at Morococha also contributed).(1) Although large

(1) In the years 1907 and 1912-1915 (the peaks of the total output series in Table F1) the exploitation of 'escorias antiguas' accounted for a large proportion of total output; 3,140 tons out of 5,525 in 1907; 1,863 tons out of 4,050 in 1912; 1,108 tons out of 3,917 in 1913, and 1,158 tons out of 3,148 in 1914. Production from this source then dropped rapidly, and ceased finally in 1918. (BCIM 106, 1922 Statistics, p.128). The fall reflected 'el agotamiento de los antiguos escoriales de "La Basura" en la region de Morococha' (BCIM 83, 1915 Statistics, p.89).

TABLE F2

Percentage Shares of Lead Output

Year	----Cerro--------- smelter output	 mines output	Non-Cerro mines	'Peruvian' non-Cerro	'Foreign' non-Cerro
1935	25.7	27.0	73.0	41.2	31.8
1941	66.2	19.7	80.3	63.5	16.8
1946	85.2	14.7	85.3	66.6	37.2
1951	53.7	26.2	73.8	58.9	14.9
1956	46.7	22.1	77.9	61.6	16.3
1961	56.0	24.2	75.8	57.9	17.9
1966	55.0	32.8	67.2	47.8	19.4
1971	40.7	29.5	70.5	41.3	29.2
1972	46.6	32.3	67.7	38.1	29.6

Source: Calculated from Table F3 below. Up to and including 1951, all shares are percentages of total final outpu; from 1956 on, Cerro's smelter share uses final output as denominator, but 'mines' shares use mineral/concentrates output.

Definitions: 'Foreign' non-Cerro = Huaron, Hochschild, Ticapampa, Buenaventura, Northern Peru, Condoroma (Hochschilds), Santander, Raura, Chavin, Santa Luisa, Madrigal.

'Peruvian' non-Cerro includes Arthur Williams (Esquilache), Volcan Mines, and Castrovirreyna Metals Mines. The percentage shares of the latter two Rosenshine companies are as follows:

1946	18.5
1951	5.7
1956	3.3
1961	2.0
1966	1.8
1971	1.5
1972	1.6

deposits of lead ores were known, production of lead for its own sake was very little developed, with production of smelted lead bars accounting for less than a quarter of the total production.(1)

The revival of lead production in the second half of the 1920's involved the entry of Cerro into specialised production of lead from its mines, and the establishment of lead furnaces at Oroya. In consequence, the renewed collapse of lead production in the Depression involved simply the closing-down of the Oroya lead smelter for several years, and the recovery of the mid-1930's began with, among other things, the reopening of Cerro's lead operations.

Already by 1935, however, the soaring increase of lead output involved other companies than Cerro. Output from Oroya was only a third of total output in 1934; and although Oroya raised its share to over three-quarters in the early 1940's, this was possible only on the basis of enormous purchases of custom ores from independent mines; Cerro's own mine output was only around 15% of the total (see Table F2). The lead boom of the 1930's, therefore, was above all a boom of independent mines, and the stagnation of the 1940's represented a limitation on the output of these independents as well as on that of the giant Cerro. As Figure F1 further shows, the renewed growth from 1948 on was most importantly another boom for the independents, although Cerro also participated in the expansion.

The decadence of the small independent silver producers with lead as a by-product during the late 1910's will not be dealt with in any detail here beyond noting that it occurred. It is, however, evident that the fall of the world price from the wartime boom level was combined with economic problems which were considered to hit hardest at small mining - particularly, one suspects,

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(1) Ibid., p.92.

the strong domestic inflation of the period 1918-1920, and the growing labour unrest in the Central Sierra. The 1921 mining statistics, commenting on the postwar decline of lead, stated[1] that it "derives from the sharp fall in the price of lead, combined with the low price of silver, in addition to the general problems, which at present make economically impossible the small-scale mining operations which formerly accounted for most of the production of lead."

Cerro's first lead furnace at Oroya began operation in 1927. The possibility of such large-scale development had been raised on various earlier occasions; in particular, the 1919 mining statistics, commenting on the pending construction of the Oroya smelter, had looked forward to the possibility of the conversion of Tinyahuarco or Casapalca into a large lead smelter serving the Central Sierra.[2]

From 1934 onwards information on lead production becomes fuller, and it is possible to trace the contributions of different companies, set out in Table F3. 1934 was the first year of the 1930's lead boom, responding partly to some firming of world lead prices but probably more importantly to the combined effects of a falling real wage rate,[3] exchange depreciation, the sharply-rising silver price, and the grim outlook for copper. The three companies which led the field in 1934 were Cerro, the French-owned Compagnie des Mines de Huaron, and the new Sociedad Minera de Yauli (Gildemeister). Other mainly silver-producing companies at Cailloma, Sacracancha, Ticapampa, and Tamboraque were also coming into the picture. With the partial exception of Cerro, the focus at this stage was really on silver, in the extraction of which lead

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(1) BCIM 106, p.128

(2) BCIM 100, p.132. The same reference noted that the large-scale development of the lead deposits in Ancash was awaiting construction of the Chimbote-Recuay railway, then projected.

(3) Hunt, p.5. (1974)

TABLE F4

Leading Lead Producers Ranked by Output, 1934-1961

Period	Rank	Name of Company	Output (tons)
1934-37	1	Compagnie des Mines de Huaron	29,360
	2	Cerro	28,453
	3	Sindicato Explotador de Sacracancha	3,986
	4	Sociedad Minera de Yauli	2,097
	5	Cajabamba Mining and Milling	396
1941-49	1	Cerro	83,819
	2	Compagnie des Mines de Huaron	74,082
	3	Compania Minera de Atacocha	52,298
	4	Minas de Cercapuquio S.A.	34,666
	5	Colquijirca (Negociacion E.E. Fernandini)	32,482
	6	Volcan Mines Co	32,369
	7	Sociedad Minera de Yauli	21,658
	8	Sindicato Minero Rio Pallanga	12,038
	9	San Antonio de Esquilache (A.H. Williams)	12,018
	10	Anglo-French Ticapampa	6,417
	11	Negociacion Minera L.A. Proano	5,432
	12	Sindicato Explotador de Sacracancha	4,042
1950-55	1	Cerro	155,467
	2	Compania Minera Atacocha	80,293
	3	Compagnie des Mines de Huaron	49,411
	4	Volcan Mines Co	27,044
	5	Minas de Cercapuquio S.A.	26,627
	6	Colquijirca (Fernandini Clotet Hnos)	19,458
	7	Sindicato Minero Rio Pallanga	16,471
	8	San Antonio de Esquilache (Hochschild)	15,822
	9	Northern Peru Mining Co	14,370
	10	Sociedad Minera de Yauli	12,216
	11	Compania Minera Milpo	10,864
	12	Compania Minera de Huanca	9,236
	13	Negociacion Minera Proano	8,828
	14	Corporacion Minera Castrovirreyna	6,256

Period	Rank	Company	Output (tons)	% of total
1956-61	1	Cerro	195,252	23.4
	2	Compania Minera Atacocha	107,801	12.9
	3	Compagnie des Mines de Huaron	53,984	6.5
	4	Compania Minera Milpo	46,112	5.5
	5	Minas de Cercapuquio	41,439	5.0
	6	Sindicato Minero Rio Pallanga	34,787	4.2
	7	Colquijirca (El Brocal)	28,037	3.4
	8	Volcan Mines Co	19,176	2.3
	9	Northern Peru Mining Co	19,600	2.3
	10	San Antonio de Esquilache (Hochschild)	18,249	2.2
	11	Compania Minera Buenaventura	17,399	2.1
	12	Compahia Minera Palca	15,549	1.9
	13	Sociedad Minera de Yauli	14,219	1.7
	14	Compania Minera Huanca	11,669	1.4
	15	Negociacion Minera Proano	11,639	1.4
	16	Compania Minera Santo Toribio	10,966	1.3
	17	Corporacion Minera Castrovirreyna	10,717	1.3
		Others	177,697	21.3
		Total	834,292	100.0

1962-67	1	Cerro	283,423	30.9 30.9
	2	Compania Minera Atacocha	116,575	12.7 12.7
	3	Compania Minera Milpo	57,431	6.3 6.3
	4	Compagnie des Mines de Huaron	48,813	5.3 5.3
	5	Compania Minera Raura	36,776	4.0 4.0
	6	Sindicato Minera Rio Pallanga	34,346	3.7 3.7
	7	Compania Minera Buanaventura	29,754	3.2 3.2
	8	Colquijirca (Cia El Brocal)	29,056	3.2 3.2
	9	Compania Minerales Santander	23,055	2.5 2.5
	10	Minas de Cercapuquio	19,914	2.2 2.2
	11	Compania Minera Santo Toribio	18,604	2.0 2.0
	12	Sociedad Minera Yauli	17,874	1.9 1.9
	13	Compania Minera Palca	17,281	1.9 1.9
	14	Corporacion Minera Castrovirreyna	14,910	1.6 1.6
	15	Northern Peru Mining Co	13,974	1.5 1.5
	16	Compania Minera Huampar	13,289	1.4
	17	Volcan Mines Co	9,603	1.0
	18	Metalurgica del Centro	7,505	0.8
	19	Compania Explotadora de Vinchos	6,813	0.7
	20	Anglo-French Ticapampa	4,757 4,757	0.5 0.5
		Others	114,754 116,754	12.6 12.6
		Total	918,507	100.0

1968-72	1	Cerro	250,445	31.7
	2	Compania Minera Atacocha	77,004	9.7
	3	Compania Minera Milpo	54,403	6.9
	4	Compagnie des Mines de Huaron	44,571	5.6
	5	Compania Minera Raura	43,586	5.5
	6	Compania Minera Santa Luisa	36,581	4.6
	7	Compania Minera Buenaventura	26,431	3.3
	8	Sindicato Minero Rio Pallanga	26,140	3.3
	9	Compania Mina Canaria	24,533	3.1
	10	Compania Minera Santo Toribio	17,817	2.3
	11	Compania Minerales Santander	16,266	2.1
	12	Compania Minera Huampar	15,279	1.9
	13	Compania Minera Alianza (Ticapama)	14,854	1.9
	14	Colquijirca (Cia El Brocal)	13,398	1.7
	15	Chavin Mines	11,634	1.5
	16	Corporacion Minera Castrovirreyna	10,970	1.4
	17	Sociedad Minera Yauli	9,434	1.2
	18	San Ignacio de Morococha	7,654	1.0
	19	Northern Peru Mining Co	6,214	0.8
	20	Compania Minera Santa Rita	5,678	0.7
		Total listed companies	712,883	90.3
		Others	76,967	9.7
		Total	789,850	100.0

Source: Calculated from Table F3.

was also obtained. The major event of the second half of the decade in lead mining, in the context of slumping silver prices, was to be the emergence, for the first time in Peru, of companies whose main focus of operation was the production of lead (and zinc) as such - not as mere by-products. Table F4 extracts from Table F3 the leading lead producers in six periods, covering the years from 1934 to 1972. The five firms listed for 1934-37 produced a total of 63,292 tons of lead during that period out of a reported total of 109,883 tons (i.e. 58%); but these figures must be treated with extreme caution because of the limitations of the data. The individual companies' production figures cover only the reported content of their output of lead and zinc concentrates, and hence almost certainly understate considerably these firms' production (ores sent directly for smelting are excluded, as are silver ores and concentrates with subsidiary lead). In addition, it should be noted that the 1933 and 1934 reported totals are suspect, although in the absence of detailed data they can't be checked properly.

By the 1940's the quality of the statistics had recovered enormously, and it is possible to give the full details of output by company, though with a number of remaining reservations about the methodology used for the construction of the statistics (see separate section on the statistics). It did not, however, seem worthwhile trying to correct the published figures, since the changes involved would not greatly alter the picture which emerges.

For 1941-49 Table F4 shows 12 firms producing 371,321 tons out of total output of 462,130 tons (though again the two figures are not strictly comparable, the latter being the content of final output while the former represents ores and concentrates), or 80%. For 1950-55, 14 firms are shown with output 452,363 tons,

while the total 'final output' was 588,729; the 14 firms thus produced 77% of the total in this period. For 1956-61, 17 firms are shown producing 656,595 tons out of a total mine output of 834,292 - 79%. For practical purposes, the companies which appear on these lists will be treated as the 'large' and 'medium' sectors of the lead mining industry, with the remaining firms treated as minor producers. It will be seen that from the early 1940's to the early 1960's there were six firms which consistently appear at the top of the industry: Cerro, Mines de Huaron, Compania Atacocha, Minas de Cercapuquio, Volcan Mines, and Colquijirca (the Fernandini mine). Two other companies which started later than these leaders climbed into the top group during the 1950's: Sindicato Minero Rio Pallanga (which was in production by 1941, but really took off during the 1950's, particularly when it brought the Alpamarca mine into production), and Compania Minera Milpo (which began production in 1952).

In addition to Milpo, a number of other new producers entered the picture during the 1950's, especially during the first half of the decade, with stimulus from the high world prices and the Mining Code of 1950. The Corporacion Minera de Castrovirreyna(1) had entered production in 1949, but rose to importance in the mid-1950's. 1951 saw the appearance of the Compania Minera Santo Toribio(2) and the Compania Minera Huanca.(3) Milpo and the Northern Peru Mining Co. mine at Chilete entered production in 1952, and were followed in 1953 by the Compania Minera Buenaventura.(4) Compania Minera Palca(5) appeared in the statistics in 1956 along with San Juan de Lucanas (primarily a gold producer) and the compania Minera Chanchamina (which produced over 1,000 tons a year from 1956 to 1959). Compania Minera Condoroma,(6) finally, made its appearance in 1957.

Notes on separate sheet

Notes to page continued:

(1) A company owned by the Picasso family, cotton planters of Ica. The mines were first worked by the company in 1946 (Purser, 1971, pp.111 & 138) and have been very profitable.

(2) A company formed in response to high silver, lead and zinc prices to work the Santo Toribio mine in Ancash, near Huaraz. (Purser, 1971, pp.111 & 183; Malpica, 1968, pp.230-231). Both Malpica and Espinoza (1971 p.141) list this company as the main component of the properties of Miguel Caro Ramirez, David Aguilar Cornejo, and Victor L. Proano.

(3) Owned by Mateo Obradovich, with a mine at Huachocolpa (Huancavelica). (Malpica 1968, p.235).

(4) This company was formed to purchase the Julcani mine formerly owned and worked by the Sociedad Minera Suizo-Peruana Julcani, which apparently lacked working capital to develop the property beyond its existing capacity. After Cerro turned down a chance to buy the mine outright, Alberto Benavides (a Cerro employee) formed the new company as a joint venture, with Cerro putting up 33% of the capital. The Julcani mine is basically a silver-zinc producer; the lead evidently came from another mine at Huachocolpa, presumably acquired at the same time. (Purser, 1971, pp.137-138). Benavides subsequently became President of Cerro in Peru, and Buenaventura has operated in fact as a virtual Cerro subsidiary. (Malpica, 1968, p.173; Espinoza, 1971, pp.125 & 130A). Alberto Brazzini Walde is the third major shareholder.

(5) A company controlled by Mario Samame Boggio, with a mine in Lampa (Puno). (Malpica, p.229).

(6) One of the Hochschild group of companies. The original mine, in Espinar (Cuzco) closed in 1967, and the equipment was transferred to Hualgayoc. (Malpica, p.212).

The remaining companies on the lists for the 1950's and early 1960's were mainly long-established producers, often concerned mainly with metals other than lead: Ticapampa (a silver producer), San Antonio de Esquilache (a silver-lead-zinc mine worked out very rapidly by Hochschilds during the 1950's and early 1960's[1]), the Proano mines above Tamboraque; the Sacracancha mines (which were generally split among a number of private firms and the Banco Minero); the Sociedad Minera de Yauli (a consistent middle-level producer owned by the De Osma-Gildemeistar family), and several others. It is noticeable that Northern Peru Mining Company never managed to figure very high among lead producers (the Chilete mine had only limited reserves).

The 1960's brought some changes in the picture. In the first place, Cerro began to increase its share of mine output, from about 23% in the late 1950's up to 31% by the early 1970's. This reflected both development of lower levels at Casapalca, and a rapid expansion of output at Cerro de Pasco from the new MacCune open pit. The Atacocha mines, meanwhile, were beginning to approach exhaustion, although this company remained Peru's second-largest producer; the nearby Compania Minera Milpo, however, was able to maintain its share of output with a steady expansion of production. Some of the older companies disappeared from the picture: the Proaño mines above Tamboraque in 1963[2]; Palca and the Cercapuquio mines in 1969-70; San Antonio de Esquilache

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(1) Purser, p.196

(2) The large cableway at Tamboraque was put out of action when a high-voltage electricity transmission line fell onto it, and was never repaired. The Tamboraque concentrator was for several years leased to the Banco Minero, and is now leased to a private company treating custom ores from small miners; the property remains owned by the Proano family. (Interview with manager of the Tamboraque plant, September 1974).

(worked out by Hochschilds) in 1963; San Agustín at Hualgayoc in 1965; Caylloma in 1965; Huanca in 1965; San Juan de Lucanas in 1965. Indeed, 1965-66 were evidently bad years for the lead-mining industry, to judge by the number of companies which closed down at that time, and several others which suspended operations for a couple of years.

Offsetting this wastage, the 1960's produced a new generation of lead-producing firms, a couple of which quickly rose to a prominent position. Most important was the Compania Minera Raura in Huanuco, a joint venture by Cerro (60%) and the Sociedad Minera Puquiococha (40%)[1] which began production in 1963 and has since remained fifth-ranking among the lead producers with 4-6% of mine output. The Compania Minerales Santander, a subsidiary of the St. Joseph Lead Company[2], began production in 1959 and has since accounted for a little over 2% of output. The years 1967 and 1968 brought a rash of new companies of significant rank, particularly Compania Minera Canaria (1966)[3], Chavin Mines Corporation (1967),[4] and Compania Minera Santa Luisa (1968)[5]. In addition to the new producers, one of the old-established companies, Anglo-French Ticapampa, was taken over in 1967 and developed by a new consortium, Compania Minera Alianza, formed by W.R. Grace & Co. (40%), Corporation Minera Castrovirreyna (35%) and Compania Minera Condor (25%)[6].

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(1) Malpica, Los Duenos del Peru, p.230.

(2) Ibid., p.211. Rosenshine was a director (Espinoza 1971 p.138).

(3) A company formed by the Banco Minero to develop the Catalina Huanca mine in Ayacucho, an important silver-producer of the 16th-18th centuries. (Purser 1971, p.192).

(4) A small mine on the Huancavelica/Ica boundary (Purser,1971 p.139). The company is one of a number listed in Espinoza (1971) under the name of James Birkbeck (p.137).

(5) A Mitsui company (Espinoza, p.142).

(6) Purser, p.180. Malpica, p.215, names the Caro Ramirez-Aguilar Cornejo group as Grace's partners; centainly, it is possible that this group, already owning the nearby Santo Toribio mine, could have been involved in the takeover of Ticapampa, though they evidently sold out later (if Malpica is correct in naming them).

The main new arrival of the 1970's has been the Madrigal mine, opened in 1972 by the Homestake Mining Company and in that year the country's eleventh-largest producer.

Looking through the above list of the most important arrivals and departures from the ranks of major lead producers, it is difficult to avoid the general impression that there was a major change in the source of initiative in this industry between the 1940's and the 1960's. Of the leading new entrants of the 1930's and 1940's, most were firms established by Peruvians with Peruvian capital - Atacocha, Rio Pallanga, Cercapuquio and a string of smaller enterprises. Of the firms not entirely Peruvian in their origin, the most important remaining cases were development by fully-resident immigrants (Arthur Williams at Esquilache) or by immigrant organisers of Peruvian capital (Rosenshine in the Volcan, Castrovirreyna and Tangana companies). This pattern continued into the years around 1950, with the emergence of the Milpo, Santo Toribio, Huanca and Palca companies, all in the first half of the decade.

By the 1950's, however, the balance had begun toswing. As Cerro embarked on a new investment drive at the end of the 1940's, it set in motion a trend towards foreign initiative and control, and a declining entrepreneurial role for Peruvians. Northern Peru Mining Co's opening of Chilete in 1952 was the first new all-foreign mine development since San Cristobal in the early 1930's. The Buenaventura company formed the following year was a joint venture of Cerro and a couple of Cerro's Peruvian hangers-on. Hochschilds, the former Bolivian company, bought up Antonio de Esquilache from Williams in 1950, and in the mid-1950's formed the Condoroma company. Moving on to the 1960's, the 'new generation' of lead-producers was still more foreign-dominated. Raura was a Cerro-dominated joint venture; Santander a direct US subsidiary; Chavin Mines evidently part-foreign at least; and Santa Luisa a Japanese venture. Madrigal, the only

major new development of the 1970's, was entirely foreign. The reorganisation of Ticapampa was dominated by Grace, with the Peruvian partners along as passengers. Only one really important new company of the 1960's was all-Peruvian - and that venture (the Canaria company) was the result not of private initiative, but of the efforts of the Banco Minero, i.e. the State.

Two general conclusions can be drawn from the above discussion. The first is that, in lead (and zinc) mining, the Peruvian elite acted as a 'national bourgeoisie' during the period from the Depression to roughly the mid-1950's, organising new companies, introducing new technology, and financing development from local sources. From the mid-1950's, however, the elite ceased to play anything like so important a role in the organising and promoting of new ventures, and foreign firms replaced them, forming a string of joint ventures and foreign subsidiaries during the 1950's and 1960's.

The second conclusion is of considerable interest in the light of the first. In sharp contrast to the experience of the early twentieth century, when the assumption by foreign capital of a leading role in mining development was accompanied by a tendency for Peruvian owners of operating mines to sell out to foreign firms, the 1950's and 1960's did not produce any noticeable trend in this direction so far as lead (and zinc) were concerned. The national enterprises created in the 1930's, 1940's and 1950's remained firmly in the hands of their original owners throughout the life of the mines,(1) and were not (so far as one can see) offered for sale to foreign capital. (The sole notable exception was Arthur Williams' sale of Esquilache, which must be considered

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(1)One important qualification to this statement is the sale of a 20% interest in the Atacocha company to Grace in 1969 (Purser, p.120). This sale, however, left control of the company firmly in Peruvian hands and the original directors in charge.

a special case). This indicates both that lead/zinc mining remained on the whole a profitable enough investment to retain the interest of the established owners; and that Peruvian enterprises remained equal to the technological requirements of mine operation through the period. The disappearance of interest among the elite in promotion of new mining projects is thus somewhat puzzling, at first sight. Certainly the experience of 1957-58, (when the US Government imposed restrictions on lead and zinc imports and this was followed by a general recession of international prices for several years) may have frightened off some possible promoters; but the very good metals prices of the late 1960's, which made existing Peruvian enterprises very profitable, do not seem to have attracted any new private ventures. That the Canaria mine, in which foreigners had no part, should have been undertaken by the State rather than the private sector, both indicates the entrepreneurial vacuum, and suggests a possibly interesting case study; what were the current estimates of the richness of this mine, and why was private capital not interested?

The swing in control of new developments shows up not only in the names of the leading companies, but also in the percentage shares of lead production shown in Table F2 above. The important column is that showing 'Peruvian' non-Cerro mine output, which gives the proportion of total output not mined by either Cerro or the other foreign companies. From the early 1940's to the mid-1950's, the Peruvian-owned companies accounted for a consistent 60% plus of production, up from 40% in the mid-1930's. During the 1960's, as a series of new foreign-owned producers emerged, the share of independent Peruvian firms fell to below half by 1966, and below 40% by 1972. The nationalisation of Cerro in 1974 has since produced a dramatic reversal of this trend by State action.

Zinc

In contrast to lead, zinc in Peru had no importance until the 1920's when the Casapalca smelter began production of concentrates in anticipation of the establishment of an electrolytic refinery at Oroya. These concentrates were partly exported and partly stockpiled. The Depression, however, put back the refinery project, and the Casapalca concentrator was closed down in 1931(1). Rising silver prices induced Cerro to reopen the Casapalca plant during 1934, with the production of zinc concentrates as a by-product from the treatment of silver ores.(2) The prospect of a zinc refinery at Oroya, combined with the general factors favouring a resurgence of mining activity during the mid-late 1930's, encouraged a number of other companies to begin the production of zinc concentrates in the last years of the 1930's. The first independent company to become a serious producer was the Compagnie des Mines de Huaron near Cerro, a long-established producer of silver and copper, which produced its first zinc concentrates in 1936. In 1936 also the Compania Minera Atacocha was established to mine lead, zinc and silver; this company's mines came into production about 1939 and were up to full capacity by the mid-1940's. By 1941 there were four companies producing concentrates: Cerro, Atacocha, Huaron and the silver mine at Ticapampa. By 1942 the number had increased to eight(3) with the addition of Rio Pallanga, Sacracancha, San Antonio de Esquilache, and Caylloma(4). The Fernandini, Proano and Sociedad Yauli companies entered zinc production in 1944(5) (all had previously been involved in silver and lead), as did the new

(1) BCIM 111 (1932-33 Statistics) p.122. Ibid., pp.123-124 summarises the £7m programme of investment in new hydroelectric installations intended to provide power for refining.
(2) BCIM 112 (1934 Statistics) p.81.
(3) Anuario Minero 1942, p.101.
(4) Ibid.
(5) Anuario Minero 1944, p.159.

TABLE F6

Main Zinc Producers Ranked by Volume of Output, 1930-1961.

Period	Rank	Name of Company	Output (tons)
1930-37	1	Cerro	40,416
	2	Compagnie des Mines de Huaron	6,595
1941-49	1	Cerro	~~169,996~~ 158,316
	2	Volcan Mines Co	94,565
	3	Compagnie des Mines de Huaron	78,552
	4	Compania Minera Atacocha	49,064
	5	Negociacion Minera L.A. Proano	12,155
	6	Sindicato Minero Rio Pallanga	9,019
	7	Minas de Cercapuquio S A.	8,545
	8	San Antonio de Esquilache (A.H. Williams)	6,530
	9	Negociacion Minera E.E. Fernandini (Colquijirca)	6,495
	10	Sociedad Minera de Yauli	4,080
1950-1955	1	Cerro	371,384
	2	Volcan Mines Co	135,674
	3	Compagnie des Mines de Huaron	53,738
	4	Northern Peru Mining Co	37,475
	5	Compania Minera Atacocha	36,390
	6	Colquijirca (Fernandini Clotet Hnos)	21,395
	7	Sindicato Minero Rio Pallanga	20,491
	8	Negociacion Minera L.A. Proano	19,512
	9	San Antonio de Esquilache (Hochschild)	19,274
	10	Compania Minera Milpo	11,580
	11	Sociedad Minera de Yauli	7,181
	12	Compania Minera Santo Toribio	5,782
	13	Sociedad Minera Puquiococha	5,592
	14	Compania Explotadora Mina San Agustin	4,995
	15	Minas de Cercapuquio	4,855
	16	Sindicato Explotadorx de Sayapullo	4,496
	17	Corporacion Minera Castrovirreyna	3,680
	18	Compania Minera Millococha	3,399

Period	Rank	Company	Output (tons)	% of total
1956-61	1	Cerro	441,651	42.2
	2	Volcan Mines Co	69,497	6.6
	3	Northern Peru Mining Co	61,229	5.9
	4	Compania Minera Atacocha	59,193	5.7
	5	Compagnie des Mines de Huaron	53,324	5.1
	6	Compania Minera Milpo	43,943	4.2
	7	Compania de Minerales Santander	41,108	3.9
	8	Sindicato Minero Rio Pallanga	39,419	3.8
	9	Colquijirca (Cia El Brocal)	34,646	3.3
	10	San Antonio de Esquilache (Hochschild)	25,093	2.4
	11	Negociacion Minera Proano	23,920	2.3
	12	Compania Minera Santo Toribio	16,556	1.6
	13	Compania Minera Palca	14,404	11.4
	14	Sociedad Minera de Yauli	13,182	1.3
	15	Compania Minera Condoroma	9,181	0.9
	16	Compania Minera Buenaventura	8,438	0.8
	17	Sindicato Explotadora de Sayapullo	7,760	0.7
	18	Compania Minera El Pilar	7,750	0.7
	19	Minas de Cercapuquio	7,388	0.7
	20	Compania Minera Condoray	6,750	0.6
		Total, listed firms	984,432	94.1
		Other firms	61,427	5.9
		Total	1,045,859	100.0

~~1962-67~~

1962-1967	1	Cerro	818,470	50.2
	2	Compania Minerales Santander	135,673	8.3
	3	Volcan Mines Co	81,186	5.0
	4	Compania Minera Atacocha	80,343	4.9
	5	Compagnie des Mines de Huaron	65,547	4.0
	6	Northern Peru Mining Co	63,526	3.9
	7	Compania Minera Milpo	53,890	3.3
	8	Colquijirca (Cia El Brocal)	36,565	2.2
	9	Compania Minera Raura	35,838	2.2
	10	Sindicato Minero Rio Pallanga	35,761	2.2
	11	Sociedad Minera Yauli	24,236	1.5
	12	Compania Minera Santo Toribio	22,049	1.4
	13	Compania Minera Buenaventura	20,318	1.2
	14	Compania Minera Palca	20,085	1.2
	15	Minas de Cercapuquio	13,357	0.8
	16	Corporacion Minera Castrovirreyna	12,976	0.8
	17	Compania Minera Huampar	9,800	0.6
	18	Compania Minera Pacococha	8,795	0.5
	19	Compania Minera Condoroma	5,548	0.3
	20	Compania Minera Metalurgica del Centro	5,370	0.3
		Total listed firms	1,549,333	95,0
		Other firms	81,745	5.0
		Total	1,631,078	100.0

1968-1972	1	Cerro	701,451	43,9
	2	Compania Minerales Santander	140,548	8.8
	3	Compagnie des Mines de Huaron	78,288	4.9
	4	Compania Minera Santa Luisa	75,546	4.7
	5	Volcan Mines Co	74,023	4.6
	6	Compania Minera Atacocha	64,177	4.0
	7	Compania Minera Milpo	60,321	3.8
	8	Compania Minera San Ignacio de Morococha	54,852	3.4
	9	Compania Minera Raura	38,966	2.4
	10	Sindicato Minero Rio Pallanga	29,997	1.9
	11	Mina Gran Bretana	26,473	1.7
	12	Compania Minera Huampar	22,952	1.4
	13	Compania Minera Santo Toribio	21,862	1.4
	14	Colquijirca (Cia El Brocal)	21,787	1.4
	15	Compania Minera Buenaventura	19,927	1.2
	16	Sociedad Minera Yauli	18,387	1.2
	17	Northern Peru Mining Co	18,335	1.1
	18	Minas de Cercapuquio	17,027	1.1
	19	Chavin Mines Corporation	15,038	0.9
	20	Ticapampa (Cia Alianza)	11,193	0.7
		Total listed firms	1,511,150	94.6

Table F continued

1968-1972 cont.

Other firms	86,595	5.4
Total	1,597,745	100.0

Source: Calculated from Table F3.

Table F 2

Percentage Shares of Zinc Output ~~Sales~~

Year	----Cerro ------ smelter output	mines output	Non-Cerro mines output	'Peruvian' non-Cerro	'Foreign' non-Cerro
1935	0.0	100.0	-	-	-
1941	3.3	55.3	44.7	12.5	32.2
1946	1.6	22.4	77.6	64.4	13.2
1951	0.9	49.5	50.5	38.9	11.6
1956	5.4	38.3	61.7	46.7	15.0
1961	18.3	38.2	61.8	37.5	24.3
1966	22.3	51.3	48.7	27.6	21.1
1971	18.6	41.1	58.9	33.1	25.8

Source: Calculated from Table F5.

Notes: See Table F2.

Rosenshine company, Volcan Mines, which promptly rose to the rank of leading producer for several years[1].

It is immediately evident, by comparison with Table F , that the leading companies in zinc were much the same as in lead, with some shuffling of the rankings. Only two companies, San Ignacio de Morococha and Gran Bretana, appear in the zinc statistics without any corresponding lead output. However, foreign control in zinc has been more important than in lead, as can be seen from a comparison of Table F7 with Table F2 above. The principal reason for the greater foreign share of output is Cerro's very large zinc production. The other feature of Table F7 is the briefness of the period of dominance by 'Peruvian non-Cerro' firms, which reached two-thirds of total mine output in the 1940's for a few years but were pushed back below 40% by Cerro's very rapid expansion of zinc production around 1950. Over the period 1946-1971, however, Table F7 does in general show the same trend as did Table F2 - a long-run fall in the share of native firms to the benefit not only of Cerro, but also (especially in the late 1950's and the 1960's) of a number of other foreign firms, including the same new entrants identified in the section on lead.

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(1) Anuario Minero 1945, p.151. Note that in the 1944 statistics the output of Volcan was erroneously attributed to Cerro (Volcan ores were treated by the Mahr concentrator which had formerly processed the ores from Cerro's San Cristobal mine) (see Anuario Minero 1945, p.185). The error was corrected in the 1945 Anuario.

Vignettes of the Lead-Zinc Producers

1) Compania Minera Atacocha

This became and remained the biggest of the Peruvian companies engaged in lead and zinc mining. It was established in February 1936 with initial capital of S/1.5 million[1], by Francisco Gallo Diez, a Spanish citizen[2]. Gallo always remained the majority shareholder, but raised part of the capital by selling shares through the Bolsa in Lima. Among various Peruvian investors who bought a stake, the most important were Alberto Quesada (who became President of the Board), Gino Bianchini, (then Manager of Empresas Electricas Asociadas), and Enrique Torres Belon (a Peruvian mining engineer whose family were involved in Cotabambas).

The name Gallo Diez, and the Spanish citizenship, were not new to Peruvian mining. Miguel Gallo Diez (almost certainly the father or uncle of Francisco) had been a leading owner of silver and copper mines at Cerro de Pasco in the 1890's, and had sold out to Cerro in 1901 for S/1 million[3]. The family firm, Gallo Hermanos, had owned the 'El Carmen' smelter in Cerro de Pasco, and family members had owned two others, so that as of 1904 they controlled three of the nine smelters in existence in the Cerro de Pasco area[4]. These all closed down as Cerro expanded its operations, and the Gallos turned to a variety of other activities. They were involved, with Mateo Galjuf, in the development of the Vinchos silver-lead mines 40 kilometres northwest of Cerro de Pasco in the 1910's[5]. In Lima, they were

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(1) Vademecum del Inversionista 1954-55, p.461.
(2) Purser, Metal Mining in Peru, p.120; Malpica, Los Duenos del Peru (1968), p.219.
(3) See my paper, 'Entry of the Cerro de Pasco Mining Company to Peru'.
(4) BCIM 16, Table 1. Jose Gallo Ruiz owned 'La Universal' and Miguel Gallo Diez owned 'San Jacinto'.
(5) BOMP 8 (1924) pp.148-150; and article by Fort in Sintesis de la Mineria (1924), p.205. A 30-ton capacity smelter at Vinchos produced 'plomo de obra' until the early 1920's, but had closed down by 1924; the mines then continued with production of hand-picked ores. The Gallos were managers, Galjuf the main owner of the company, and the mines were leased from the estate of Juan Azalia, another of the Cerro de Pasco old-timers.

shipping agents[1] and general investors; Miguel Gallo Porras was a director of the Banco del Peru y Londres in 1930[2], while Luis Gallo Porras was on the board of the Banco Popular[3], became President of the Sociedad Ganadera del Centro[4], and for roughly ten years was Alcalde of Lima[5]. Miguel Gallo Diez spent part at least of his money from sale of mines on the purchase, with Manuel Mújica, of the hacienda Caqui in Chancay[6] and (with Aurelio Sousa) the hacienda Ucupe in Lambayeque[7], while a number of Gallos (? the same Family?) were listed as cotton growers in Piura during the 1920's.[8]

In any case, Francisco's entry into mining at Atacocha was the first venture I am aware of which bore his name. It definitely, however, marked the return of the family to a prominent role in mining, and brought the Atacocha mines into large-scale proudction for the first time.[9] Actual production by the company evidently began in ~~the late 1930's (the exact year cannot be ascertained for lack of the mining statistics for thos years), probably~~ 1938. ~~or 1939.~~ The ores were rich and easily-treated, and the company proved extremely

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(1) Dunn, Peru: a Commercial and Industrial Handbook (1925) p. 144.

(2) West Coast Leader January 20, 1931, p.1. I am assuming that the Gallo Porras family were first-generation descendants of Gallo Diez. A family tree would be most helpful.

(3) Leader, July 6, 1937, Supp.p.9.

(4) Leader, Industrial Number 1938, p.120.

(5) Leader, February 25, 1936; and Peruvian Yearbook 1944, p.4.

(6) H. Rodriguez Pastor, Caqui: Estudio de una Hacienda Costena (1969) p.135.

(7) Leader, Northern Peru Number 1935, p.43.

(8) Leader Special Cotton Number 1925.

(9) The Atacocha mines had certainly been known for their silver ores for a long time. An Englishman, J.A.W. Murdoch, worked two silver mines (El Progreso and El Porvenir) in the area at the turn of the century, and in 1906 sold out to a joint venture of Cerro and Eulogio E. Fernandini ('Entry of Cerro de Pasco Mining Company', op.cit., p.11). How the mines came into Gallo's hands is not clear; possibly Cerro and Fernandini abandoned their claims and Gallo staked out the area; or he may have purchased the mines; or the claim bought by Cerro and Fernandini in 1906 may have been different from the deposit developed by the new company.

successful, as the following summary of its outstanding capital stock and annual dividend payments indicates:

Year	Social capital at year-end S/000	Dividend paid S/000	Dividend paid %
1944	5,000	2,000	40
1945	5,000	2,000	40
1946	5,000	2,500	50
1947	30,000	3,000	28
1948	30,500	5,050	16.5
1949	30,500	7,015	23
1950	40,000	10,522	26.3
1951	40,000	19,061	47.6
1952	40,000	16,100	40.2
1953	40,000	12,000	30
1954	40,000	22,000*	55
1955	40,000	22,400*	56
1956	40,000	20,000	50
1957	80,000	-	-
1958	80,000	12,000	15
1959	80,000	12,000	15
1960	80,000	12,000	15
1961	80,000	8,000	10
1967	100,000	"	"
1969	120,000	"	"

*Additional dividends of S/3.50 (1954) and S/4 (1955) also paid out of depreciation.

Sources: Vademecum del Inversionista 1954-55 p.465-466, and 1962-63. p.515-6.
Malpica, Los Duenos, p.219.
Purser, Metal Mining in Peru, p.120

As can be seen, the capital was sharply increased several times. In September 1942 the original S/1.5m was increased to S/5m by a new share issue (taken up, evidently, by the existing shareholders)(1); this additional money was used to finance new installations, including a tailings concentrator which worked from 1944 to 1947(2). In May 1947 a shareholders' meeting approved the raising of the capital to S/40 million - an increase of 800%, to bring total capitalisation up into line with that was considered to be the real value of the company's assets and properties.(3) Shares to the value of S/20 million, corresponding to the increase in book value of the mines, were distributed free to the existing shareholders (four new shares for each old one), and the remaining S/15 million was to represent new capital raised from sale of shares.

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(1) Vademecum 1954-55 p.461.
(2) See the 'Memoria' for 1944 reprinted in Anuario Minero 1944 pp.147ff; and for 1947 in Anuario 1947, pp.131ff.
(3) See new valuation of company assets by Enrique Torres Belon in Anuario 1946, reprinted in Anuario 1946, pp.144-145.

These latter shares (a total of 1.5 million shares) were issued in three sets: 500,000 in August 1947, 50,000 in May 1948, and the last 950,000 in August 1950. At least the 1950 issue was offered preferentially to existing shareholders; the same was probably true of the other two.(1)

The intention of the new issues was to finance the installation of a new 1,000-ton capacity concentrator and accompany installations(2). Orders for the new plant were placed abroad in September 1947, on the basis of an import licence granted by the Government and an assurance that the necessary foreign exchange (a total of £400,000) would be available from the Central Bank.(3) Controls, however, were tightening, foreign exchange was becoming increasingly scarce, and deliveries from the USA were subject to delays. The company obtained only £200,000 in exchange from the Central Bank, and was obliged eventually to finance the balance of its import programme from the sale of exchange certificates following the relaxation of exchange controls in late 1948.(4) The new plant was eventually completed in March 1949, and a new cableway (bought second-hand from the old Compania Minera Nacional mine at Huachon) installed.

The third major increase of capital was approved by a shareholders' meeting in July 1956, following another writing-up of the book value of the mines. Shareholders were issued (free) with one new additional share for each share already held, bringing capital up to S/80 million. At the same time authorised capital was raised to S/100 million(5), and this additional S/20m was

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(1) Vademecum 1954-55, p.461.
(2) Anuario 1946, p.145.
(3) 'Memoria' for 1947, in Anuario 1947, p.133; and that for 1948 in Anuario 1948, p.139.
(4) Ibid; and 'Memoria' 1949, in Anuario 1949, p.185.
(5) Vademecum 1962-63 p.510.

evidently issued some time during the 1960's. Finally, in 1969 W.R. Grace and Co bought a 20% stake in the company via the purchase of a further share issue of S/20 million.(1)

The ownership and management of the Atacocha company remained very stable over the period from 1936 to 1968, and this is reflected in the membership of the board of Directors:

Year	Members of the Board
1946	President: Alberto Quesada Managing Director: Edgardo Portaro Directors: Gerardo Diez Gallo, Francisco Jose Gall, Enrique Torres Belon.
1954	President: Alberto Quesada Managing Director: Edgardo Portaro Directors: Gino Bianchini, Gerardo Diez Gallo, Enrique Torres Belon.
1962	President: Alberto Quesada Managing Director: Edgardo Portaro Directors: Francisco Jose Gallo, Gerardo Diez Gallo, Enrique Torres Belon.
1968	Alberto Quesada, Gino Bianchini, Enrique Torres Belon, Edgardo Portaro, Francisco Gallo.

Sources: Anuario 1946, p.130; Vademecum 1954-55, p.461; Vademecum 1962-63, p.510; Malpica, Los Duenos del Peru, p.219; Espinoza Uriarte, Dependencia Economica y Technologica, p.144.

Obviously, for this company the high years were from 1949 through to 1956, coinciding with the period of most rapid expansion of lead and zinc mining in Peru. These were years of favourable market conditions for the two metals, following the removal of Peruvian exchange controls and the Korean boom. By 1957 world markets were weakening, and in 1958 the USA imposed import quotas, as a result of which export prospects for Peruvian producers worsened markedly. Atacocha's output and profits fell in the late 1950's, and the recovery of output in the early 1960's reflected not so much any response to improved market conditions, as an attempt to beat the depressed prices by raising output.(2)

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(1) Purser, p.120
(2) Vademecum, 1962-63, p.513.

Perhpas its is worth emphasizing overall the extent to which Atacocha remained entirely a national enterprise until 1969. Espinoza's searching study of interlocking directorates, which managed to link most of Peru's mining companies with Cerro and/or ASARCO, failed entirely to find any link for Atacocha and virtually ignored the company, despite its position as the most important Peruvian firm in the industry.(1) The partnership with Grace in 1969 was the first break in the independent tradition of the firm, and was presumably shortlived, as Grace abandoned Peru shortly afterwards.(2)

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(1) Dependencia Economica y Technologica: Caso Peruano, Part 2.

(2) This may have been one of the ventures in which Grace planned to use their Agrarian Reform bonds to finance investment.

Sindicato Minero Rio Pallanga

This was one of the mining ventures by the established capitalist elite during the 1930's. The company was established in November 1937 by a group headed by Ricardo Barreda y Laos, Enrique Pardo Heeren, Antenor Rizo Patron, Aurelio Garcia Sayan, and Hugo Cohen.[1] The immediately obvious feature of this group is the connection between these names and coastal plantation agriculture. The Pardo and Barreda families had a long background in sugar[1]; Hugo Cohen was Manager of Casagrande[2]; Antenor Rizo Petron was a major Canete cotton grower[3]. Aurelio Garcia Sayan, besides being Vice-President of the Sociedad Ganadera del Centro[4], was almost certainly the son of Aurelio Garcia y Lastres, who had been Jose Pardo's Minister of Hacienda in the 1910's[5]. Malpica also mentions that one of the major shareholders as of 1967 was Antonio Chopitea Heudebert[6]; and although the name Chopitea does not crop up on any boards of directors, it is worth noting that the Sindicato was set up just at the time that the Chopiteas were negotiating the sale of the Laredo sugar estate to the Gildemeisters.[7]

The second notable feature of the group is the presence of Antenor Rizo Patron, another of the old-time mining figures at Cerro de Pasco, or his son or nephew. Several members of the Rizo Patron family had been active in mining in the area at the turn of the century. Hector, Andres and Carlos Rizo Patron all figured as the owners of mines bought up by Cerro in 1901-1902[8]; Andres had been the owner of the El Triunfo smelter established in 1898[9], and Carlos had had a large number of mich mines which he had sold mainly to Eulogio Fernandini at the time of Cerro's arrival. Antenor had presumably been a son of one of these established mining entrepreneurs, and started out as a mining engineer, working in the Backus and Johnston smelter at Casapalca, and later at Fernandini's Huaraucaca smelter, where he identified the vanadium ores of Mina Ragra and the bismuth ores of San Gregorio.[10] Although retaining an interest in small-scale mining, the Rizo Patron younger generation had moved, like the Mujicas, Bentins and Gallos, out of mining into agriculture during the 1910's and

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1. The Pardos with Tuman; the Barreda y Laos family in the Sociedad Agricola San Nicolas, which however by the 1930's had gone over to cotton.
2. Malpica, p.223.
3. Ibid.; and Memoria de la Camara Algodonera 1945, Anexo .
4. Leader, Industrial Number 1938-39, p.120.
5. Paz Soldan, Diccionario Biografico, p.200.
6. Malpica, p.223.
7. Reference not to hand, but the sale went through 1937 or 1938. Note that the Chopitea Heudeberts were the descendants of Jose Ignacio Chopitea and Alfonso Heudebert, who had been Chopitea's estate manager and later became a partner in Laredo. Probably Chopitea's daughter or son married Heudebert's s or daughter. In the late 1930's, Chopitea's children were reported to be still minors (?).
8. See 'Entry of the Cerro de Pasco Mining Compa ny'.
9. BCIM 16, Table 1.
10. Basadre, Historia, pp.3493ff.

1920's. Carlos Rizo Patron bought a grazing estate, Maraynioc, near Tarma, in 1921[1]; and in the same year Antenor bought the sheep hacienda Atocsayo from Duncan Fox & Co[2]. In 1925 Antenor was listed as the owner of the cotton hacienda Chacarilla in Surco (near Lima)[3] and he went on to become one of the leading cotton planters in the Canete valley[4]. He joined the SNA in 1928[5] and became a director in 1930[6]. In 1930 also he joined the board of the Banco Popular[7], a position he retained until his death in 1948. He was also one of the Banco Central Hipotecario founders.[7a]

Antenor and Carlos Rizo Patron returned to mining in the 1930's. Carlos had owned the Compania Explotadora de Huallanca, a silver-mining enterprise in Huanuco which closed down in the mid-1920's.[8] In the 1930's he became one of the leading gold miners for several years[9]. Antenor also went into gold mining during the 1930's, appearing on the 1937 board of the Compania Minera Aryabamba[10], and becoming President of the Compania Minera Chanchamina[11].

Considering the long association of the Rizo Patron family with mining in the Central Sierra, and the lack of previous mining connections among the other members of the Sindicato Rio Pallanga, it seems reasonable to suppose that the venture was promoted by Antenor Rizo Patron, who brought in with him other capitalists encountered in the Sociedad Nacional Agraria during the early 1930's. Indeed, the mining properties may well have been owned by the Rizo Patrons prior to the formation of the Sindicato.

The company started out with a lead-zinc mine at Marcapomacocha, in the Cerro Rio Pallanga. In 1952 it bought another lead-zinc deposit at Alpamarca, where a second concentrator was built in the mid-1950's. This second plant, with a daily capacity of 300 tons, opened in early 1957.[12] The company also bought several mines at Yauli in 1953[12], and opened a third concentrator at Carhuacayan in the mid-1960's[13]; the original mine had evidently closed down by the end of the 1960's.[14] During the 1960's also the company obtained control of the Compania Minera de Sayapullo[15]. The Rizo Patron family remained (as of 1968) involved in several other mining ventures, via shareholdings and directorships.[16]

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1. Leader, December 28, 1921, p.20
2. Leader, June 4, 1921, p.1.
3. Leader Special Cotton Number 1925
4. Camara Algodonera Memoria 1943, Anexo ; Malpica, pp.124-125.
5. SNA Memoria 1928-29.
6. Leader, May 27, 1930, p.27.
7. Banco Popular Memoria 1930. 7a. Peruvian Times July 16, 1948, p.21.
8. BOMP 8, pp.93-96; and 26, p.35.
9. Leader, Industrial Number February 1938, p.lxxxvi.
10. Leader, November 16, 1937, p.13.
11. Peruvian Times, July 16, 1948, p.21.
12. Vademecum 1954-55, p.474; and 1958-59, p.489.
13. Malpica, p.223.
14. Purser, p.124, mentions only the Carhuacayan and Alpamarca mines as operating.
15. Ibid.; and Espinoza, p.126.
16. Espinoza, p.133.

The growth of the company's capital, and its dividend record, are given below. The first few capital increases represented new share issues which were sold to raise additional capital: S/150,000 in March 1942; S/1,350,000 in April 1942; and S/600,000 in April 1943. Thereafter the periodic increases of capital represented merely the distribution of stock among the shareholders as the book value of properties was steadily revalued upwards.[1]

Year	Social capital S/m	Capital + reserves	Dividend S/000	%
1937	0.3			
1938	0.3			
1939	0.3			
1940	0.3			
1941	0.3			
1942	1.8			
1943	2.4			
1944	2.4	2.7	360	15
1945	2.4	2.8	240	10
1946	2.4	2.8	960	40
1947	2.4	3.0	960	40
1948	2.4	11.2	2,160	22.5
1949	9.6	12.6	3,360	35
1950	12.0	16.2	5,280	44
1951	12.0	21.5	8,400	70
1952	12.0	25.7	4,800	40
1953	12.0	26.4	2,400	20
1954	12.0	29.9	4,800	40
1955	18.0	64.2	4,800	40
1956	24.0	70.8	4,800	20
1957	24.0	80.3	2,400	10
1958	24.0	83.0	4,800	20
1959	24.0	80.9	7,200	30
1960	24.0	83.1	4,896	20
1961	24.0	85.5	2,400	10
1967	24.0			
1968	30.0			
	477,479			527,529

Sources: Vademecum 1954-55 p.473; 1958-59, p.487; 1962-63, p.523; Malpica, p.223; Espinoza, p.125.

As usual, the board of directors reveals few changes during the period from establishment of the company to the 1960's.

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1. Vademecum 1954-55, p.473.

Year	Members of the Board
1946	President: Ricardo Barreda y Laos Vice-President: Hugo Cohen Directors: Aurelio Garcia Sayan; Enrique Pardo Heeren; Antenor Rizo Patron
1954	President: Ricardo Barreda y Laos Vice-President: Hugo Cohen Directors: Aurelio Garcia Sayan; Enrique Pardo Heeren; Antenor Rizo Patron Managing Director: Amador Nycander.
1958	President: Ricardo Barreda y Laos Vice-President: Hugo Cohen Directors: Aurelio Garcia Sayan; Enrique Pardo Heeren; Antenor Rizo Patron A. Managing Director: Amador Nycander
1962	President: Ricardo Barreda y Laos Vice-President: Antenor Rizo Patron A. Directors: Enrique Pardo Heeren; Aurelio Garcia Sayan; Amador Nycander ; Alfonso Rizo Patron.

Sources: Vademecum.

The fact that Antenor Rizo Patron of Cerro de Pasco fame died in 1948[1] suggests that the 'Antenor Rizo Patron A.' who appears in the above directorates may have been his son or nephew. This needs more investigation; it is quite possible that it was the younger Antenor who started up the Sindicato along with sons of friends of his father/uncle? To answer this one we need a family tree and some questions to a member of the family.

In summary, this was a company started and run by established families of the Peruvian elite. Interlocking directorates from this company carry one to virtually every other sector of the Peruvian economy, and would be extremely laborious to trace in full. Here, however, are a few to start with:

Ricardo Barreda y Laos: Compania de Seguros Rimac (1930's); President of Junta Nacional de la Industria Lanar; director of Sociedad Ganadera del Centro, President of Sociedad Ganadera Corpacancha, director of Fabrica de Tejidos 'Los Andes', President (1930's) of Sociedad Agricola San Nicolas

Enrique Pardo Heeren: Managing Director (1945) of Cia de Seguros y Reaseguros El Pacifico; director of Cia de Almacenes Generales

Aurelio Garcia Sayan: On 1941 Banco Minero board; director of San Luis Gold Mines & Cia Explotadora de Huarangullo; involved in Banco Wiese; 1953 legal representative of Socony Vacuum Oil Development Company of Peru; Vice-President (1939's) of Soc Ganadera del Centro.

Hugo Cohen: an official of Gildemeister & Co, and at some time manager of Casagrande; director of Cia de Seguros Fenix Peruana late 1920's-early1930's.

Volcan Mines Company and Castrovirreyna Metal Mines

These have been the most prominent of the mining companies launched in Peru by Leon James Rosenshine, a US mining engineer active in Peru from the early 1920's. Rosenshine first came to Peru as a young graduate of the University if California, in 1920, and worked at Caylloma as an engineer in 1922. He then returned to the US mining industry for several years, before renewing his interest in Peru in the late 1920's.[1] In 1928 or 1929 he became Manager of the new Cajabamba Mining and Milling Company, the President of which was M.J. Heller of New York.[2] Heller was already at this stage interested in the Volcan mines, and the Heller-Rosenshine partnership was behind a series of ventures in the early 1930's. The Cajabamba mine came into full production in time to reap the benefits of the boom in silver prices in the mid-1930's, and was for several years one of the leading silver producers.[3] Rosenshine went on to form a series of successful gold companies - San Luis, Andaray, Chabuca, Capitana - with progressively-greater Peruvian participation as he moved away from his original North American backers and became increasingly identified with a group of prominent Peruvians. Rosenshine's partnership with Lima capitalists was most significant in the two lead-zinc companies which he formed in partnership with the Beltran Espantoso family: Castrovirreyna Metal Mines and Volcan Mines Co. Both of these ventures began production during the 1940's, under pressure of wartime conditions and under contracts with the US Government. At the same time, Rosenshine was involved with Andres Dasso in an attempt to develop coal mines near Chimbote.[4]

The composition of the Rosenshine-Peruvian group is well summarised in the board of directors of Castrovirreyna Metal Mines in 1946:[5]

> President : Felipe Beltran
> Directors: Felipe Ayulo Pardo, Eulogio Fernandini C., Aurelio Garcia Sayan, Ernesto A. Baertl.
> Managing Director: Leon J. Rosenshine.

The other side of Rosenshine's success, his continuing connections with

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1. Peruvian Times Mining and Petroleum Number June 1953, p.130.
2. Leader, July 17, 1934, Supp. p.ix.
3. This was the Colquipocro mine, more recently worked by the Cia Minera Colquipocro.
4. Peruvian Times, December 18, 1942, p.24; and June 4, 1943, p.6. Rosenshine and Dasso established the Compania Carbonera Pallasca, of which Rosenshine was managing director.
5. Anuario 1946, p.146.

US capitalists, is equally well summed up in the board of San Luis Gold Mining Company (unchanged between 1938 and 1945)[1]:

President: M.J. Heller (New York)
Managing Director: L.J. Rosenshine
Directors: W.J. Spalding (a Lima-resident engineer and contractor); Andres F. Dasso (connection to the Lima business and financial elite); J.M. Price (New York, representing Union Carbide); C.B. Lihme (New York).

The Volcan silver-lead-zinc mine near the Ticlio pass on the Central Railway had been worked during the Colony and at various times since, mainly for silver and gold. In the 1920's the owners, Aurelio Ingunza y Hermanos, installed a concentrator at Anticona near the mine[2], which was operating by 1924. In 1924 or thereabouts Cerro decided not to exercise an option which it held on the property, and Martin J. Heller formed the first Volcan Mining Company, in association with Peruvian interests, to take an option.[3] This first venture failed for lack of money; but in 1925 Heller took a new option to buy the mines for £p45,000 and this was eventually exercised.[4] The mines were worked on a small scale in the late 1920's, and possibly the early 1930's (they do not appear in the mining statistics for the early 1930's, however).

In 1935 Rosenshine formed the Volcan Mines Leasing Company in Panama, which set up a Peruvian subsidiary with capital of $1,000,[5] This company first appeared in the official statistics as a producer of lead and zinc in 1937. By the 1940's the name had been changed to Volcan Mining Company[6] and Heller's interests had been bought out.[7] In the early 1940's no production was recorded for the mine; but in 1944 Cerro offered Volcan Mines the use of the Mahr Concentrator which had been built in 1937 to treat the ores from the San Cristobal mine at Yauli, and thus saved from having to obtain and instal an expensive (and virtually unobtainable, in wartime) flotation concentrator, the company was able to embark directly on the large-scale production of zinc concentrates for the US Metals Reserve Company.[8] Lead production followed in 1945, by which time Volcan was the largest single producer of zinc and the second-largest lead producer.[9]

In 1951 a 400-ton-capacity selective flotation plant was installed at the mine, and development of the San Florencio and Carahuacra mines at Yauli (bought up immediately after the war) took production up over 200,000 tons. By 1968 (at whichnstage the company was quoted on the Lima Bolsa, though no

1. Leader, Industrial Number February 1938, p.lxix; and Anglo-American Yearbook 1944, p.iii.
2. BOMP 8, pp.119-123; Leader, September 15, 1925, p.32.
3. Peruvian Times Mining and Petroleum Number 1953, p.130; BOMP 8 , pp.119-123.
4. Ibid.
5. Malpica, p.209.
6. See the Anuario Minero for the 1940's. Malpica, however, gave the old name in his survey, written in 1967.
7. Peruvian Times, Mining and Petroleum Number 1953, p.130.
8. Ibid.; and Anuario 1945, p.185.
9. Anuario 1945, pp. 138 & 151.

information appears in the earlier Vademecum del Inversionista) the company had assets of S/154 million and subscribed capital of S/65 million, with profits running at about 12% of capital[1]. When Rosenshine retired to live in New York, about 1968 or 1969, he passed the mine over to the Beltran family, who have operated both this property and Castrovirreyna Metal Mines since.

Castrovirreyna Metal Mines emerged as a producer of lead, copper, silver and gold (in a single concentrate sold to Oroya) in 1945[3] (having installed a 150 ton concentrator in 1944), and later in the 1940's began to produce zinc also. This enterprise was based on mines at Quispisisa in Huancavelica leased from the old Pflucker family company, Compania Minera Santa Ines y Morococha, which had been relatively inactive since the sale of its main mines at Morococha to Haggin in 1905. The Quispisisa and San Julian mines in Castrovirreyna had, however, been worked for silver during the 1910's and 1920's, and a new flotation concentrator was installed there in 1924[2]. These were among the mines which had been expected to benefit from the projected Huancavelica-Castrovirreyna railway begun under Leguia but never completed, and transport difficulties (solved in the 1940's and 1950's by use of motor lorries) explained the failure to develop the mines on a large scale earlier. The Castrovirreyna mines, while profitable for the Rosenshine group, were never producers of more than modest relative size (see Table).

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1. Purser, p.132.
2. BOMP 8, pp.82-83.
3. Anglo-American Blue Book December 1944 p iii.

Minas de Cercapuquio S.A.

This company was established in August 1934 to develop the lead-zinc mines near Chongos Alto in Huancayo province.[1] The mines had been known and worked intermittently for many years. From 1912 to 1919 Pedro Balarin, a Peruvian, had worked the mines for lead. In 1919 he entered partnership with Lizardo Caceres, who recognised the existence of cadmium in the ores, on the basis of which the mines were offered for sale to Cerro.[2] Cerro took an option on the mines in 1927[3] but decided not to exercise it, ~~and the Balarin-Caceres partnership does not reappear in the later history of the mines~~.

The leading force in the new company seems to have been Aurelio Loret de Mola, a man whose name was new to the ranks of the capitalist elite in the 1930's. Of the S/600,000 initial capital, in 12,000 shares, 9,000 shares (~~S/x,xxx~~ S/450,000 equivalent) went to the owners of the mines, and 3,000 were sold on the open market. Balarin clearly became a shareholder, and appears on the board of directors in the 1950's, but Caceres' name does not reappear in the later history of the company; it is possible that Loret de Mola had bought out Caceres' share in the property.(Check). Capital was increased in January 1938 to S/700,000 by a new share issue. There followed a series of capital increases as the company proved successful.

In December 1942, following revaluation of the mines, capital was raised to S/2.1m by a stock distribution, In November 1947 the book value of the mines was again written up and a further one-for-one stock distribution made to the shareholders, bringing capital up to S/4.2m. On top of this an additional new issue of S/800,000 was sold at par to the shareholders. In April 1951 a further issue of S/3m was approved, again bought up at par by the existing shareholders.[4] In November 1955 the S/8m capital was doubled by a one-for-one share distribution, and in March 1957 there was a further S/4m share distribution.[5] By 1967 capital had been further increased to S/25m.[6]

These capital increases, and the company's dividend record, are set out below:

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1. Vademecum 1946-47, p.366.
2. V. Miranda, 'Cadmium' in D. Rodriguez Hoyle (ed) Peru Minero 1967, p.2.
3. BOMP 26, p.39.
4. Vademecum 1954-55, p.467.
5. Vademecum 1962-63, p.517.
6. Malpica, p.225.

Year	Social capital (S/m)	Dividend S/000	%
1944	2.1	210	10
1945	2.1	126	6
1946	2.1	630	30
1947	5.0	840	40
1948	5.0	2,615	52.3
1949	5.0	1,500	30
1950	5.0	1,000	20
1951	8.0	3,250	40.6
1952	8.0	1,600	20
1953	8.0	1,600	20
1954	8.0	2,800	35
1955	8.0	3,600	45
1956	16.0	5,600	40
1957	20.0	3,200	20
1958	20.0	2,400	12
1959	20.0	2,400	12
1960	20.0	2,400	12
1961	20.0	1,400	7
1967	25.0		

Sources: Vademecum, various, and Malpica.

As with other lead-zinc companies, Cercapuquio enjoyed a run of great prosperity from the late 1940's through to the market recession of the late 1960's; this was reflected both in the high level of dividends and in the rapid upward revaluation of the firm's assets via share distributions. Not surprisingly (and again, in keeping with the general trend) the company's shares wre closely held within the initial group of capitalists. In 1967 Malpica[1] reported that the main shareholders were Aurelio Loret de Mola, Oscar F. Arrus, and Alberto Brazzini - all members of the original board. The list of boards of directors for various years below indicates the leading figures in the company's history:

Year	Board members
1946	President: Oscar F. Arrus Directors: Aurelio Loret de Mola, Hector J. Marisca, Alberto Brazzini, Juan M. Raffo.
1952	President: Aurelio Loret de Mola Directors: Hector J. Marisca, Jose Pflucker Tejada, Alberto Brazzini, Pedro Balarin.

1. Malpica, p.225.

1968 board. Pres: Oscar F. Arrus
Directors: Aurelio Loret de Mola, Hector J. Marisca,

1954 President: Aurelio Loret de Mola
Directors: Hector J. Marisca, Alberto Brazzini W., Jose Pflucker Tejada, Carlos Loret de Mola.

1962 President: Aurelio Loret de Mola
Directors: Oscar F. Arrus G., Alberto Brazzini W., Carlos Loret de Mola.

Sources: Vademecum 1946-47, p.366; 1954-55, p.467; 1962-63, p.517; Peruvian Times Mining and Petroleum Number June 1953, p.14.

These names give some impression that the Loret de Mola family may have been increasing their share over time; and it does seem that some of the names at one time associated with the company vanish from its history. Pedro Balarin, for example, appears only on the 1952 board (which may actually be the 1950 board, given the problem of knowing the Peruvian Times' source). Juan F. Raffo, an obvious pipeling to the Board of the Banco de Credito, was 'director de turno' in 1945[1], but by the 1950's was pretty old (he had been a maj figure of the 1920's and 1930's). The role of the Pflucker family in this enterprise remains shrouded in mystery; Jose Pflucker Tejada appears on the board at the end of the 1940's, and had left by 1958[2], his presence thus spanning the most prosperous years of the company; but neither Malpica nor Espinoza mention any Pflucker connection by the late 1960's.

~~The new company began lead production at the end of the 1950's, with a 60 ton flotation concentrator imported from the USA and installed in 1957~~.

The other connections of the leading figures in Cercapuquio deserve some further comment. Oscar F. Arrus, besides being a major shareholder and for many years President of the company, owned the 'El Inca' knitwear factory in Lima during the 1940's[3](?financed by profits from the mine??) and held the top post in the Government's statistics department. Alberto Brazzini W. was also Managing Director of the Sociedad Minera Puquiococha in 1948[4], and in the 1960's became part-owner (in partnership with Hochschilds) of the Acari copper mine in Arequipa. He also held, as of 1968, a 10% stake in the Compania Minera Pativilca[5], and was on the boards also of Compania Minera Raura and Minas de Arcate, providing thus one of the binding links in Espinoza's chain of interlocking mining directorates.[6] His training had been as an engineer), Hector J. Marisca was a Lima lawyer associated with several

1. Peruvian Times April 27, 1945, p.38.
2. Vademecum 1958-59 p.481.
3. Peruvian Times February 21, 1941, p.8.
3. Peruvian Times March 31, 1944, p.15.
4. Anuario 1948, p.149
5. Purser, p.147, for the Acari and Pativilca references.
6. Espinoza, p.131.

of the mining developments of the 1930's (he was on the Sindicato Minero de Parcoy board[1]) and also served on the Empresas Electricas Board as a trustee for the London bondholders.[2] His presence on the Cercapuquio Board may have been due as much to his position as Legal Adviser as to his actual stake in the enterprise.

Finally, for the Loret de Mola family the Cercapuquio company was the foundation stone of their business interests. By 1968, they had taken a leading role in the development of four other mining companis: Compania Minera Huampar, Minas de Venturosa, Minas de Millococha SA, and Cia Minera Cerro Noroeste.[3] I have not traced their interests outside mining as yet.

The owners of Cercapuquio, thus, were distinguished by two characteristics: they company was for most of them their main business interest; and most of them rose to prominence on the basis of the company's success, having been relatively obscure previously.- Arrus the statistician, Brazzini the engineer, Marisca the lawyer, Balarin the former small-time miner. For this group, the enterprise proved an effective channel for social and economic mobility. It is worth noting that of the original capital of S/600,000, only S/150,000 ($35,000) was actual finance raised by the shareholders, with an additional S/100,000 in 1938. From then on the company's growth was self-financed out of profits. Part at least of the early development work may have been finqnced by bank loans, but information on thisis not available at this stage.

The new company began lead production in 1937 or 1938; a new 60-ton capacity flotation concentrator was imported from the USA and installed in 1937[4], and by 1941 the company was Peru's fourth-largest lead producer. In 1941 the concentrator capacity was expanded to 100 tons, and in 1942 the production of zinc-cadmium concentrates began.[5] From then on the company was Peru's main cadmium producer[6]. By the mid-late 1960's the mines were nearing exhaustion, and there were serious technical problems in the treatment of the ore. Profitability was dependent largely upon the cadmium content of the ore.[7] I gather that the mine is now closed, but the Cercapuquio group retain their interest in several other mines still in production.

1. Leader, March 2, 1937, Supp. p.i.
2. Peruvian Times, April 14, 1944, p.11.
3. Malpica, pp.225-226; Espinoza, p.132.
4. Peruvian Times, February 21, 1941, p.8.
5. Peruvian Times, November 6, 1942, p.24; and April 27, 1945, p.38.
6. Anuario 1945, p.174.
7. Purser, pp.133-135.

Appendix I

Derivation of Table C1 showing shares of certain companies in metals output.

(1) Company	(2) Metal content	(3) % of Peru total	(4) ∴ Value of company output, S/000
1. COPPER			
1935			
Cerro, mines	20,907 tons	70.5	14,546
Cerro, Oroya	29,160 "	98.3	20,282
Northern Peru	-	-	-
Peru total	29,653 "	100.0	20,633
1942			
Cerro, mines	18,830	53.3	31,823
Cerro, Oroya	30,123	85.3	50,908
Northern Peru	3,775	10.7	6,380
Peru total	35.332	100.0	59,711
1945			
Cerro, mines	15,529	48.7	26,036
Cerro, Oroya	25,298	79.3	42,414
Northern Peru	n.a.	n.a.	n.a.
Peru total	31,916	100.0	53,510
1950			
Cerro, mines	11,518	38.0	79,856
Cerro, Oroya	23,572	78.4	164,652
Northern Peru	4,546	15.1	31,485
Peru total	30,050	100.0	209,901
1955			
Cerro, mines	27,566	67.0	479,966
Cerro, Oroya	32,014	73.8	528,679
Northern Peru	5,410	12.5	89,292
Peru total	43,403	100.0	716,367
1960			
Cerro, mines	25,800	14.2	405,813
Cerro, Oroya	33,679	18.5	529,743
Northern Peru	5,116	2.8	80,470
Southern Peru Copper	130,109	71.6	2,046,509
Peru total	181,721	100.0	2,858,324
1965			
Cerro, mines	25,196	14.0	496,411
Cerro, Oroya	40,994	22.7	807,663
Northern Peru	5,545	3.1	109,248
Southern Peru Copper	118,161	65.5	2,328,007
Peru total	180,336	100.0	3,552,978
1970			
Cerro, mines	27,911	13.4	1,328,979
Cerro, Oroya	n.a.	31.3[c]	3,105,203[c]
Northern Peru	5,924	2.8	282,071[b]
Southern Peru Copper	131,073[a]	62.9[a]	5,223,971[b]
Peru total	208,457	100.0	9,925,655

1970

Cerro, mines	27,911	13.4	1,328,979
Cerro, Oroya[a]	36,942	17.7	1,758,989
Northern Peru	5,924	2.8	282,070
Southern Peru Copper[b]	140,741	67.5	6,701,366
Peru total	208,457	100.0	9,925,655

1972

Cerro, mines	30,007	13.7	1,031,560
Cerro, Oroya[a]	40,080	18.3	1,377,843
Northern Peru	6,291	2.9	216,268
Southern Peru Copper[b]	137,040	62.5	4,711,071
Peru total	219,126	100.0	7,532,970

a. Assumed equal to total output of refined copper plus copper in sulphates.
b. Assumed equal to total output of blister.

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2. SILVER

1935

Cerro, mines	233,346 kilos	42.6	19,600
Cerro, Oroya	377,093 "	68.8	31,674
Northern Peru	38,554	7.0	3,238
Peru total	548,000	100.0	46,030

1942

Cerro, mines	117,000	23.5	10,004
Cerro, Oroya	430,502	86.4	36,853
Northern Peru	5,091	1.0	436
Peru total	498,745	100.0	42,642

1945

Cerro, mines	84,000	20.8	9,117
Cerro, Oroya	304,572	75.3	33,034
Northern Peru	8,759	2.2	950
Peru total	404,275	100.0	43,848

1950

Cerro, mines	81,598	17.8	25,999
Cerro, Oroya	263,018	57.3	83,802
Northern Peru	11,282	2.5	3,595
Peru total	459,038	100.0	146,258

1955

Cerro, mines	180,473	25.3	99,169
Cerro, Oroya	377,916	52.9	207,664
Northern Peru	30,739	4.3	16,891
Peru total	713,751	100.0	392,204

1960

Cerro, mines	196,000	18.2	125,727
Cerro, Oroya	465,000	48.6	335,198
Northern Peru	25,440	2.7	16,319
Southern Peru Copper	24,150	2.4	15,491
Peru total	956,603	100.0	689,572

1965			
Cerro, mines	306,034	28.7	294,013
Cerro, Oroya	655,968	57.8	689,153
Northern Peru	25,403	2.2	26,688
Southern Peru Copper	22,824	2.0	23,979
Peru total	1,134,355	100.0	1,191,742
1970			
Cerro, mines	298,301	24.1	595,267
Cerro, Oroya	n.a.	n.a.	n.a.
Northern Peru	30,185	2.4	60,234
Southern Peru Copper	c	c	c
Smelted/refined[d]	681,343	55.0	1,359,638
Peru total	1,239,023	100.0	2,472,503
1972			
Cerro, mines	282,061	22.5	546,024
Cerro, Oroya	n.a.	n.a.	n.a.
Northern Peru	35,855	2.9	69,409
Southern Peru Copper	c	c	c
Smelted/refined[d]	751,234	59.8	1,454,265
Peru total	1,255,664	100.0	2,430,759

c. Not separately available, but relatively very small (see 1960 & 1965).
d. Because no disaggregated figures are given for smelted output by company, the fine content of silver in bullion, sterling silver, silver bars, and copper bars is taken as a proxy for Cerro plus Southern. The result is to overstate their share, by including various other small producers of silver bars and sterling silver.

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3. GOLD

1935			
Cerro, mines	639.4 kilos	18.5	3,012
Cerro, Oroya	890.4 "	25.8	4,195
Northern Peru	717.8	20.8	3,382
Peru total	3,451.3	100.0	16,261
1942			
Cerro, mines	745.5	9.3	5,427
Cerro, Oroya	2,191	27.3	15,950
Northern Peru	238	3.0	1,732
Peru total	8,013	100.0	58,332
1945			
Cerro, mines	860.2	16.0	6,292
Cerro, Oroya	1,684	31.4	11,690
Northern Peru	58.6	1.1	429
Peru total	5,370	100.0	39,279
1950			
Cerro, mines	734	15.9	10,563
Cerro, Oroya	1,139	24.7	16,392
Northern Peru	54.5	1.2	784
Peru total	4,603	100.0	66,243

1955			
Cerro, mines	631	13.2	15,120
Cerro, Oroya	1,880	35.4	40,579
Northern Peru	69	1.4	1,653
Peru total	5,311	100.0	114,635
1960			
Cerro, mines	643	14.7	18,231
Cerro, Oroya	1,526	34.8	43,034
Northern Peru	92.6	2.1	2,625
Southern Peru Copper	38	0.9	1,072
Peru total	4,385.6	100.0	123,675
1965			
Cerro, mines	747.7	22.9	21,805
Cerro, Oroya	1,096.8	33.5	31,985
Northern Peru	102.1	3.1	2,977
Southern Peru Copper	36.6	0.1	1,067
Natomas	459.2	14.0	13,391
Peru total	3,271.6	100.0	95,408
Metal bars	1,420.5	43.4	[illegible]
1970			
Cerro, mines	223,1	6.7	9,851
Cerro, Oroya	n.a.	n.a.	n.a.
Northern Peru	130.9	3.9	5,780
Southern Peru Copper	n.a.	n.a.	n.a.
Natomas	466.8	13.9	20,611
Peru total	3,349.1	100.0	147,879
Metal bars	1,268.6	37.9	50,014
1972			
Cerro, mines	174.3	7.0	13,603
Cerro, Oroya	n.a.	n.a.	n.a.
Northern Peru	155.0	6.0	12,097
Southern Peru Copper	n.a.	n.a.	n.a.
Natomas	-	-	-
Peru total	2,465.7	100.0	192,429
Metal bars	1,611.8	65.3	125,329

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4. LEAD

1935			
Cerro, mines	10,285 tons	36.0	3,717
Cerro, Oroya	7,347 "	25.7	2,651
Peru total	28,545	100.0	10,316
1942			
Cerro, mines	5,829	13.0	5,203
Cerro, Oroya	38,079	84.8	33,989
Peru total	44,881	100.0	40,061
1945			
Cerro, mines	5,005	9.3	4,291
Cerro, Oroya	41,299	77.0	35,410
Peru total	53,664	100.0	46,012
1950			
Cerro, mines	19,732	31.8	79,951
Cerro, Oroya	34,488	55.5	139,739
Peru total	62,118	100.0	251,691

1955			
Cerro, mines	27,566	23.2	161,436
Cerro, Oroya	31,626	26.6	185,212
Northern Peru	4,713	4.0	27,601
Peru total	118,751	100.0	695,445
1960			
Cerro, mines	32,212	24.5	166,886
Cerro, Oroya	74,141	56.3	384,115
Northern Peru	.3,132	2.4	16,226
Peru total	131,630	100.0	681,959
1965			
Cerro, mines	49,519	32.1	350,543
Cerro, Oroya	86,807	56.2	614,503
Northern Peru	1,996	1.3	14,130
Peru total	154,344	100.0	1,092,594
1970			
Cerro, mines	46,632	29.7	442,743
Cerro, Oroya	72,509	46.3	688,430
Northern Peru	1,110	0.7	10,539
Peru total	156,770	100.0	1,488,439
1972			
Cerro, mines	57,411	31.1	535,066
Cerro, Oroya	86,009	46.6	801,598
Northern Peru	1,454	0.8	13,551
Madrigal	3,560	1.9	33,179
Peru total	184,381	100.0	1,718418

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5. ZINC

1935			
Cerro, mines	8,476 tons	87.4	2,386
Cerro, Oroya	-	-	-
Peru total	9,693 "	100.0	2,728
1942			
Cerro, mines	9,042	38.9	5,926
Cerro, Oroya	752	3.2	493
Peru total	23,260	100.0	15,244
1945			
Cerro, mines	14,849	24.3	7,006
Cerro, Oroya	1,583	2.6	750
Peru total	61,154	100.0	28,854
1950			
Cerro, mines	45,570	51.9	173,429
Cerro, Oroya	1,262	1.4	4,803
Peru total	87,879	100.0	334,448
1955			
Cerro, mines	85,903	51.7	273,202
Cerro, Oroya	17,056	10.3	54,244
Northern Peru	10,343	6.2	32,894
Peru total	166,082	100.0	528,200

1960			
Cerro, mines	73,317	40.8	277,633
Cerro, Oroya	32,573	18.3	124,521
Northern Peru	7,797	4.3	29,525
Peru total	178,122	100.0	680,930
1965			
Cerro, mines	156,287	61.4	767,689
Cerro, Oroya	62,932	24.7	309,125
Northern Peru	9,954	3.9	48,894
Peru total	254,496	100.0	1,250,096
1970			
Cerro, mines	128,162	42.8	968,011
Cerro, Oroya	71,011	23.7	536,348
Northern Peru	3,179	1.1	24,011
Peru total	299,136	100.0	2,259,382
1972			
Cerro, mines	165,562	44.0	1,649,243
Cerro, Oroya	69,810	18.6	695,411
Northern Peru	3,324	0.9	33,112
Madrigal	5,895	1.6	58,723
Peru total	376,129	100.0	3,746,804

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6. IRON

1955			
Marcona	1,056,269 tons	100.0	338,647
Peru total	1,056,269	100.0	338,647
1960			
Marcona	2,347,434	75.0	670,625
Peru total	3,131,022	100.0	894,484
1965			
Marcona	6,342,415[f]	89.3	1,190,017
Peru total	7,103,973[f]	100.0	1,333,907
1970			
Marcona	6,249,358	100.0	2,772,844
Peru total	6,249,358	100.0	2,772,844
1972			
Marcona	6,085,626	100.0	2,787,187
Peru total	6,085,626	100.0	2,787,187

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7. BISMUTH, ANTIMONY, CADMIUM ETC

Estimates of valuation of Oroya output: S/000

1935	1,475
1942	9,770
1945	9,454
1950	32,448
1955	38,766
1960	90,876
1965	196,615
1970	508,036
1972	265,370

APPENDIX 3

Some Problems in the Output Statistics for Peruvian Mining.

The Peruvian Government has produced remarkably comprehensive statistics of the mining industry annually since 1903.[1] The statistics show, among other things, the output of the main mineral products and the value of this output at international (accounting) prices. The historical series reproduced in sources such as Anuario Estadistico del Peru generally consist of figures drawn from the annual statistics, without regard to the changing methodology and coverage of those statistics. The purpose of this note is to look a little more closely at the methods used to assemble the official mining statistics, and to indicate some of the more obvious pitfalls involved in uncritical use of the easily-available historical series.

To begin with, some of the main problems faced by the statisticians can be summarised as follows:

1) What is the method of calculating the volume of a metal contained in various mining products? ~~This may sound simple, but in fact is very complicated~~. In the simplest form of mining economy, where only one metal is produced and the producer carries out on the spot all the processing, so that the final output consists of pure metal, no problem arises: the metal content of the product is equal to the weight of the product. (E.g. bars of pure copper). In the Peruvian case, however, there are two very important complications. In the first place, only part of the country's mining output is in the form of pure metals. Most gakes the form of semi-processed minerals, in forms such as high-grade ores, concentrates, and impure smelter products (e.g. blister copper). With such products the weight of the metal contained is less than the weight of the total product, and it is necessary to estimate 'content'.

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1. The 1903-1922 statistics were published annually under the title 'Estadistica Minera del Peru' in various issues of the Boletin del Cuerpo de Ingenieros de Minas, and the 1932-1937 statistics appeared in the same source under the title 'La Industria Minera en el Peru'. The 1923-1930 statistics appeared in various issues of the Boletin Oficial de Minas y Petroleo (BOMP). From ?1938 on the statistics have been published as Anuario de la Industria Minera en el Peru; this was initially produced as various issues of the Boletin Oficial de la Direccion de Minas y Petroleo (a continuation of BOMP), but from 1949 on appeared as the Boletin of the Instituto Nacional de Investigacion y Fomento Mineros (Ministerio de Fomento). From 1948 on the oil industry statistics have been published separate from the mining statistics.

In the second place, Peruvian ores are mostly complex ones, containing a number of different metals together, and the products of the mining industry consequently contain mixtures of metals. Thus, for example, lead is produced not only in the form of lead bars, lead ores, lead concentrates; but also appears as a trace or subsidiary metal in zinc and silver concentrates.

These complications mean that there are various different possible measures of 'metal content'. The statistician may rely on assay techniques, which give the 'assay' or 'fine' content of the ore, concentrate or other product ; or he may use an estimate of the 'recoverable' content, which corresponds to the amount of each metal which can reasonably be expected to be extracted by existing refining techniques. In addition, the statistician may give figures for all products containing the metal in question, or he may limit his figures to the amounts contained in the principal products containing the metal, ignoring products in which it occurs in only very small quantities.

2) What is understood as 'total output'? In a mining industry where each producer operated in isolation from others and all sold their output to external buyers, total output would consist simply of the sum of all individual producers' production. In Peru, however, many independent miners have sold ores and concentrates to central smelting plants for further processing, and the metals contained in such ores and concentrates appear twice in the mining statistics; once as the output of the independent miner, and once in the output of the smelter (mainly Cerro). Given that technology does not permit 100% recovery of metals from ores(at least not yet), there is some wastage in the smelter, so that the total 'assay' content of metals entering the smelter is greater than the 'assay' content of the smelter's output. If the mining statistics use assay content as the measure of output (as was done in Peru until 1959) then the effect of additional processing (with accompanying wastage) is progessively to <u>reduce</u> the apparent volume of production; thus if output were measured as the assay volume of ores mined, it would appear considerably greater than if the assay measurement is used on products sold either to other sectors within the local economy or to overseas buyers. In order to avoid double-counting, the statistician must

proportion of smelter output which corresponds to separately-shown mine output. Which he decides to exclude will obviously affect the size of his totals.

3) How is metal content to be valued? Obviously, a unit of a metal contained in ore is worth less than a unit of the same metal contained in refined output (assuming there is some value added in processing..). Ideally, therefore, metal should be valued differently according to the nature of the product in which it is contained. In practice, this is very difficult and complicated; it is much simpler to use a blanket value, or at most two or three general values (e.g. value of the metal in a 60% concentrate and value in refined form). The statistics of value will be most accurate when it is possible to make detailed market valuations of each individual product; and least accurate when uniform price estimates are used on all types of product.

In addition, it is necessary to know whether values are given at local market prices, or FOB (overseas price minus freight and insurance) or CIF in foreign markets. Since the best price series are those for the major foreign markets (New York, London etc) there are strong practical reasons for using these prices to value the output of an exporting country like Peru; but if not properly corrected to FOB values, these prices will fail to correspond to the actual sums received by producers. Ideally, but in practice impossible until very recently, is valuation 'at the factory (or mine) gate', excluding the cost of transport to ports, warehousing charges and other costs not associated with the actual production process.

The Peruvian Statistics

Perhaps inevitably, the Peruvian statistics in the early twentieth century started out using the simplest methodology possible. Assay content was used as the basic measure; output was taken as the final form in which material was exported; and values were taken as the assay content multiplied by the overseas price of the refined metal, with no deductions for cost of refining or to convert from a CIF to an FOB basis. As time went on, various refinements were introduced, and by the 1960's the statistics were showing 'recoverable content', valued FOB, and with mineral/concentrate output clearly

1) The measurement of metal content.

Up to and including 1958, the Peruvian statisticians used assay content of the various products as their figure for total volume of output. In the 1959 statistics, for the first time the concept of 'recoverable content' was introduced and the figures from then on showed content on this basis.[1] On the whole, it seems that the amount of each metal in all mining products was given in the total, although the statistics prior to the 1930's do not show enough disaggregated detail of their construction for us to be certain of this. Certainly, throughout the statistics have included, for example, the silver and gold contained as subsidiary metals in blister-copper bars; and in the early twentieth century, also, the structure of output tended to be relatively simple with the most complex ores left little developed. Thus the errors involved in omission of small amounts of some metals contained in ores or concentrates of other metals are unlikely to be of great importance.

2) The definition of 'total output'.

Here there have been more changes and problems, as statisticians chopped and changed. In general, up to the 1930's total output was effectively the assay content of products sent for export. (The mining products used in the Peruvian economy, mainly silver and gold, were those presenting the least problems of measurement, and were generally in pure or nearly-pure form). Total output represented, thus, the assay content of ores mined less any losses in concentrating, smelting and refining. This general definition continued to be used for most metals through the 1940's. So far as I can see, the first breach came with the opening of Cerro's electrolytica zinc refinery in the early 1940's. Until 1944 the statistics showed total zinc output

1. Anuario de la Industria Minera 1959, p.2.

as equal to the assay content of zinc bars produced plus the assay content of concentrates not put through the refinery[1]. This gave total output for 1944 of 48,976 tons. The 1945 statistics, however, changed the methodology and revised the 1944 figure.[2] In the 1945 statistics total zinc output was shown as the assay content of all concentrates produced, including those subsequently refined at Oroya. The output of the Oroya refinery was excluded from the total 'por procedar de los concentrados'. As a result, the 1944 output of zinc was revised to 57,109 tons - an increase of 16.6% on the earlier figure. This increase was evidently due primarily to the fact that zinc content 'lost' in the refining stage (i.e. not recovered) was added back into the total 'output'. Rather surprisingly, this methodological change does not appear to have been made at this time for other metals. Gold, silver, copper and lead all continued to be reported in terms of 'final' output in the 1945 statistics, and thereafter until 1951. In fact, the zinc figures were also taken back briefly to the old system in the 1950 statistics[3].

In 1952 there was a general change of methodology. All production of ores, concentrates, and metallurgical products produced on the spot was taken as total output, and the output of the Oroya smelter was entirely excluded (Cerro's production of ores and coneentrates at the various mining centres being given separately). The effect of this methodological change can best be seen by comparing the total output shown in the 1951 statistics (using the old methodology) with the 1951 output shown in the 1952 statistics, using the new methodology. The table below compares the two.

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1. Anuario 1944 p.157.
2. Anuario 1945, p.150.
3. Anuario 1950, p.143. This reference includes a retrospective revision of the 1949 total which is blatantly 'cooked' to keep the total output unchanged; total 'concentrates' production is simply increased by an amount equal to the 1949 output of zinc in bars. (Cf Anuario 1949, p.189).