

PHELPS DODGE CORPORATION

COPPER QUEEN BRANCH

Notations From Annual Reports

Years 1909 through 1950

also

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	Accident Record 1912 through 1950

July, 1958

Bisbee, Arizona

C. E. Mills



TABLE NO. 2

PRODUCTION FROM BLOCK CAVE AREAS

Southeast Extension - During Operation of Concentrator

Year	Mill Ore		Smelting Ore		Total Production		
	Tons	% Cu	Tons	% Cu	Tons	% Cu	Gross Lbs. Cu.
1925	44,244	1.943	7,995	1.999	52,239	2.240	2,088,680
1926	191,405	2.265	-	-	191,405	2.265	8,670,480
1927	257,653	2.087	-	-	257,653	2.087	10,756,586
1928	280,536	2.212	-	-	280,536	2.212	12,414,089
1929	398,449	2.017	24,167	2.340	422,616	2.035	17,201,165
1930	559,005	2.122	1,866	2.841	560,871	2.125	23,833,969
1931	522,158	2.183	20,069	4.176	542,227	2.256	24,472,083
Total	2,253,450	2.133	54,097	3.034	2,307,547	2.154	99,437,052
Silver - Ounces & Grade					274,849	0.119	
Gold - Ounces & Grade					11,727	0.00508	

Southeast Extension - After Concentrator Shutdown

Year	Shipped as Smelter Flux		Gross		Year	Shipped as Smelter Flux		Gross	
	Tons	% Cu	Lbs. Cu.			Tons	% Cu	Lbs. Cu.	
1932	-	-	89,821		1940	187,539	2.08	7,786,367	
1933	-	-	-		1941	214,075	2.03	8,701,066	
1934	9,381	2.95	553,997		1942	237,650	1.61	7,670,757	
1935	115	1.53	3,514		1943	247,418	1.54	7,616,912	
1936	-	-	-		1944	157,148	1.94	6,115,862	
1937	37,390	2.61	1,951,256		1945	60,622	2.20	2,671,023	
1938	173,184	2.62	9,090,682						
1939	164,673	2.59	8,516,304		Total	1,489,195	2.040	60,767,561	

Total - Southeast Extension

	Tons	Grade		
		Cu.	Ag.	Au.
Production 1925 - 1931	2,307,547	2.154	0.119	.00508
Production 1932 - 1946	1,489,195	2.040	0.115	.00235
Total	3,796,742	2.110	0.118	.00401

North Block of East Ore Body

Year	Mill Ore		Smelting Ore		Total Production		
	Tons	% Cu	Tons	% Cu	Tons	% Cu	Lbs. Cu.
1929	51,286	1.240	68	5.477	51,354	1.244	1,276,925
1930	18,151	1.032	-	-	18,151	1.032	372,771
1931	2,447	0.775	-	-	2,447	0.775	37,936
Total	71,884	1.170	68	5.477	71,952	1.173	1,687,632
Silver - Ounces & Grade					5,345	.0743	
Gold - Ounces & Grade					258	.00359	



TABLE NO. 3

Sac Hill Concentrator - Tonnage Received

<u>Year</u>	<u>Concentrated</u>	<u>C & A Stockpile</u>	<u>Smelter Flux</u>	<u>Total Crushed</u>
1923	615,177		35,333	650,510
1924	1,488,122		23,744	1,511,856
1925	1,300,248		83,710	1,383,958
1926	1,322,342	7,107	116,078	1,445,527
1927	1,262,494	17,493	153,971	1,433,958
1928	1,263,729	15,388	149,921	1,429,038
1929	1,445,425		110,346	1,555,771
1930	1,089,910		47,549	1,137,459
1931	579,096			579,096
Total	10,366,533	39,988	720,652	11,271,730

Data On Concentrator Operations

Operations started	April 1923
Mill shut down	October 1931
Operating Days	2,518
Tons per Day	3,632
Dry Tons Milled	10,366,533
Grade - % Cu	1.81
Percent Silica	60.94
<u>Concentrates</u>	
Tons Produced	1,633,341
Ratio of Concentration	6.35
Grade - % Cu	10.26
Extraction - Percent	89.29



TABLE NO. 4

Phelps Dodge - Copper Queen Branch

Recovery from Leach Dumps

	<u>Tons</u>	<u>% Cu</u>	<u>Gross Lbs.</u>
<u>Dumps No's. 1 & 2</u>			
Material On No. 1 Dump	1,995,105	0.89	35,678,816
Material on No. 2 Dump	<u>1,526,176</u>	<u>0.69</u>	<u>20,961,474</u>
Total	3,521,281	0.80	56,640,290
Pounds Extracted			<u>34,942,834</u>
Pounds Remaining			21,697,456
Percent Recovered			61.69
 <u>Mill, No. 4 & 5 Dumps</u>			
Material on Dumps	6,416,213	0.21	27,605,985
Pounds Extracted			838,502
Pounds Remaining			26,768,483
Percent Recovered			2.68
 <u>Dump No. 7</u>			
Material on Dump	9,089,550	0.26	47,205,893
Pounds Extracted			21,439,312
Pounds Remaining			25,766,581
Percent Extracted			45.42

Remarks: Main period of leaching No. 1 & 2 dumps was from 1924 to early in 1932. Successive periods included 1936 into 1938; 1939 to 1941 and 1942 into 1944 when the ferric iron reached 307 lbs. per M gals. with a cost of 8.5¢ per lb. of Cu. for iron.

Production from the Mill and Dumps 4 & 5 began in September 1930 and ended September 1931. Most of the copper recovered was from the Mill dump as No's. 4 & 5 were on fractured ground with more than 50% loss in water. During the first month heads contained 10.4 lbs. per 1000 gals. but rapidly decreased to less than 3 lbs. of copper.

The major portion of the copper from No. 7 dump was recovered in 1929 through 1931. Leaching was attempted again in 1937 and 1938 and from the fall of 1941 to March 1944 when the heads dropped to 3.9 lbs. and ferric iron increased to 40.1 lbs.



PRODUCTION RECORD - PHELPS DODGE CORPORATION
WARREN MINING DISTRICT

Year		Tons Ore	Production of Metals - Gross			
			Ounces Gold	Ounces Silver	Pounds Copper	Pounds Lead
Prior	C. Q. Cons. Mining Co.	137,910			13,850,075	
to	Other Producers	<u>205,977</u>			<u>20,685,929</u>	
1885	Total	343,887			34,536,004	
1885	C. Q. Cons. Mining Co.	13,509			6,721,535	
1886	C. Q. Cons. Mining Co.	22,907			3,797,360	
1887	C. Q. Cons. Mining Co.	30,374			5,945,550	
1888	C. Q. Cons. Mining Co.	55,298			9,379,949	
1889	C. Q. Cons. Mining Co.	62,939			9,408,000	
1890	C. Q. Cons. Mining Co.	59,394			9,031,680	
1891	C. Q. Cons. Mining Co.	64,478			10,203,683	
1892	C. Q. Cons. Mining Co.	65,094			9,806,764	
<u>Note:</u>						
	Holbrook & Cave Mining Co. 1887 to 1892, Inclusive	81,306			14,708,000	
1893	C. Q. Cons. Mining Co.	91,113			13,795,618	
1894	C. Q. Cons. Mining Co.	89,272			12,688,372	
1895	C. Q. Cons. Mining Co.	97,882			15,741,731	
1896	C. Q. Cons. Mining Co.	139,242			23,298,150	
1897	C. Q. Cons. Mining Co.	163,411			23,999,873	
1898	C. Q. Cons. Mining Co.	189,340			33,749,390	
1899	C. Q. Cons. Mining Co.	212,894			36,901,684	
1900	C. Q. Cons. Mining Co.	199,249			34,382,309	
<u>Total to 12/31/00</u>						
	C. Q. Cons. Mining Co.	1,694,306			272,701,723	
	Others (above)	<u>287,283</u>			<u>35,393,929</u>	
	Total	1,981,589			308,095,652	



PRODUCTION RECORD - PHELPS DODGE CORPORATION
WARREN MINING DISTRICT
(Continued)

Year		Tons Ore	Production of Metals - Gross			
			Ounces Gold	Ounces Silver	Pounds Copper	Pounds Lead
1901	C. Q. Cons. Mining Co.	275,799	3,265	169,560	39,781,333	
1902	C. Q. Cons. Mining Co.	243,202	4,095	168,378	35,831,755	
1903	C. Q. Cons. Mining Co.	270,028	4,497	170,164	36,939,800	
1904	C. Q. Cons. Mining Co.	415,297	3,623	243,724	61,225,522	
1905	C. Q. Cons. Mining Co.	492,804	5,362	270,785	76,971,982	
1906	C. Q. Cons. Mining Co.	566,880	8,236	388,964	79,807,461	
1907	Regular Mine Ore	469,625	4,184	333,611	62,383,948	
	Precipitates	196	-	22	119,013	
	Total	469,821	4,184	333,633	62,502,961	
	Lease Ore	1,322	4	2,716	361,651	
	Dump Ore	18,626	3	1,870	934,511	
	Slag	61,746	-	-	3,025,068	
	Flue Dust & Cleanings	1,013	6	504	92,781	
	Total	552,528	4,197	338,723	66,916,972	
1908	Regular Mine Ore	528,657	7,613	510,420	80,620,242	
	Basic Sulphide Ore	33,212	716	11,202	1,264,395	
	Precipitates	444	-	122	309,595	
	Total	562,313	8,329	521,744	82,194,232	
	Lease Ore	654	4	1,950	227,104	
	Slag	814	-	-	41,304	
	Cleanup	139	3	1,293	63,063	
	Total Copper Ore	563,920	8,336	524,987	82,525,703	
	Lead Ore	256	9	5,769	2,674	197,634
Total	564,176	8,345	530,756	82,528,377	197,634	
1909	Regular Mine Ore	566,518	8,239	585,000	83,010,976	
	Basic Sulphide	29,462	412	7,981	1,287,758	
	Precipitates	272	-	76	169,008	
	Total	596,252	8,651	593,057	84,467,742	
	Lease Ore	73	1	26	13,738	
	Slag	6,635	-	88	345,817	
	Flue Dust & Cleanings	196	-	2	14,670	
	Total Copper Ore	603,156	8,652	593,173	84,841,967	
	Lead Ore	538	30	8,881	4,835	437,601
Total	603,694	8,682	602,054	84,846,802	437,601	



PRODUCTION RECORD - PHELPS DODGE CORPORATION
WARREN MINING DISTRICT
(Continued)

Year		Production of Metals - Gross				
		Tons Ore	Ounces Gold	Ounces Silver	Pounds Copper	Pounds Lead
1910	Regular Mine Ore	594,032	12,322	600,457	76,070,955	
	Basic Sulphide	600	14	157	31,588	
	Precipitates	262	-	59	180,582	
	Total	594,894	12,336	600,673	76,283,125	
	Lease Ore	557	7	809	144,654	
	Total Copper Ore	595,451	12,343	601,482	76,427,779	
	Lead Ore	742	87	6,615	1,129	696,118
Total	596,193	12,430	608,097	76,428,908	696,118	
1911	Regular Mine Ore	588,527	12,015	599,191	73,154,430	
	Basic Sulphide	12,912	-	-	425,496	
	Precipitates	377	2	212	359,339	
	Total	601,816	12,017	599,403	73,939,265	
	Lease Ore	5,958	1,808	270,109	483,301	
	Total Copper Ore	607,774	13,825	869,512	74,422,968	
	Lead Ore	11,359	3,070	359,032	67,162	5,658,930
Total	619,133	16,895	1,228,544	74,489,728	5,658,930	

Note: Mine production figures from the start of operations up to and including the year 1911 have been gathered from various sources and are thought to be the most reliable available. It is felt that for all practical purposes they should be used as official production of the Copper Queen Consolidated Mining Company and its predecessors.

W.A.N.
10/8/58



PRODUCTION RECORD - PHELPS DODGE CORPORATION
WARREN MINING DISTRICT
YEARS 1912 - 1957

Year	Tons - Copper Ores								
	Douglas Smelting Ore			Sac Hill			To Concentrator		
	Cu Ores	Lease Ore	Precip	Cleanup & Misc.	& Porphyry	Exp. Conc.	Other Smelters	Sulphide	Porphyry
1912	669,399	9,411	998	64,770			30,164		
1913	712,444	21,524	603	94,256		4,765	18,316		
1914	674,365	10,807	584	11,502		6,543	5,098		
1915	739,116	9,956	601	46,965		4,407	2,681		
1916	833,889	19,390	765	73,657			2,221		
1917	737,729	35,986	816	3,267	237	2,124			
1918	692,591	66,585	915	632		1,272			
1919	531,542	55,366	612	1,910	7,220	8,027			
1920	426,251	88,476	507		4,151		77,792		*233,914
1921	117,895	1,305	434		12,046		19,651	*4,359	*344,135
1922	252,990	53,710	347		28,913		16,657		
1923	349,555	129,219	154		16,764		23,430		635,903
1924	393,749	83,582	684		24,040				1,491,170
1925	419,891	102,058	746		84,143				1,299,409
1926	376,210	84,211	1,301		116,078				1,322,939
1927	328,560	66,290	2,110		153,971				1,263,564
1928	273,053	67,533	8,379		151,088				1,262,354
1929	354,355	105,727	9,753		124,868				1,444,714
1930	224,153	55,729	9,421		95,114				1,089,583
1931	212,034	45,006	6,214	12	78,084		2,462		572,113
1932	244,601	8,903	818	15,611					
1933	303,726	18,985	559	5,897					
1934	445,377	57,152	437	14,606	9,381				
1935	482,520	85,467	510	9,730	115				
1936	647,673	145,675	663	1,503					
1937	768,955	156,794	3,587	323	37,390				
1938	635,968	36,944	1,348	953	173,184				
1939	698,241	42,392	1,424	8	164,673				
1940	757,932	15,890	1,924	49	187,539		46,994		
1941	482,042	30,646	807	20	214,075		354,206		
1942	763,636	22,395	1,018	5	237,650		**88,547		
1943	603,853	8,912	918	10	247,418		**266,655		
1944	373,606	788	733	9	157,148		**103,108		
1945	124,772		677	4	60,622				
1946	46,560		444	4					
1947	270,719		848	1					
1948	302,941		381	21					
1949	138,413		429	5					
1950	196,872		271			184		21,532	
1951	371,875		311					118,309	
1952	368,634		381					128,873	
1953	413,047		344			2,328		163,611	
1954	490,409		400					109,911	1,645,922
1955	420,663		416					125,338	4,431,214
1956	486,925		5,094					145,163	5,068,987
1957	490,477		9,206					139,591	4,441,328

Note: * Placed on Dumps.
** 309,116 tons to Clarkdale including Marginal Ore mined for account of Metals Reserve Company.



PRODUCTION RECORD - WARREN MINING DISTRICT
YEARS 1912 - 1957
(Continued)

Year	Lead and Zinc Ores				Manganese Lessors
	Outside Smelters	Phelps	Dodge		
	Company	Lessors	Concentrator	Smelter	
1912	1,465	10,161			
1913	14,800	773			
1914	23,304	626			
1915	22,899	239	3,913		
1916	23,113	349	1,427		751
1917	14,658	2,571	818		2,379
1918	3,363	108			5,058
1919	29				
1920		827			254
1921	11,573	4,234			
1922	26,156	10,594			
1923	17,194	17,351			
1924	9,168	19,803			
1925	12,600	21,796			94
1926	7,528	10,264			2,490
1927		2,948	*6,721	10,433	4,068
1928			3,421	16,159	3,806
1929				15,961	2,853
1930		100		879	317
1931		736			
1932		6,026			
1933		1,567			
1934	43				
1935					
1936	432				
1937	200	439			
1938		94			
1939		931			
1940		491			
1941		28			
1942					
1943					
1944	15,172				
1945	107,501		17,093		
1946	7,220		189,904		
1947	27		286,730		
1948			218,466		
1949			281,520		
1950			153,730		
1951			40,426		
1952			43,599		
1953			10,455		
1954					
1955					
1956					
1957					

Note: * Concentrator started June 13, 1927; shutdown May, 1928.



PRODUCTION RECORD - WARREN MINING DISTRICT
YEARS 1912 - 1957
(Continued)

Year	Lead and Zinc Ores				Manganese Lessors
	Outside Smelters	Lessors	Concentrator	Smelter	
1912	1,465	10,161			
1913	14,800	773			
1914	23,304	626			
1915	22,899	239	3,913		
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1925	12,600	21,796			94
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1929				15,961	2,853
1930		100		879	317
1931		736			
1932		6,026			
1933		1,567			
1934	43				
1935					
1936	432				
1937	200	439			
1938		94			
1939		931			
1940		491			
1941		28			
1942					
1943					
1944	15,172				
1945	107,501		17,093	40,399	1,763
1946	7,220		189,904	52,919	
1947	27		286,730	15,868	
1948			218,466		
1949			281,520		
1950			153,730		
1951			40,426		
1952			43,599		
1953			10,455		
1954					
1955					
1956					
1957					

Note: * Concentrator started June 13, 1927; shutdown May, 1928.



PRODUCTION RECORD - WARREN MINING DISTRICT
YEARS 1912 - 1957
(Continued)

Year	Production of Metals						
	Total Production Tons	Copper	Silver	Gold	Lead	Zinc	Manganese
1912	786,368	88,280,908	1,027,130	18,023	2,953,685		
1913	867,481	97,181,725	919,138	16,213	5,701,628		
1914	732,829	86,066,143	1,036,672	15,769	8,889,175		
1915	830,777	88,551,180	943,368	18,974	9,388,418		
1916	955,562	102,685,722	1,096,136	24,030	9,421,562		NA
1917	800,585	93,618,409	828,665	19,156	6,870,128		NA
1918	770,524	90,988,156	558,434	16,409	1,234,497		NA
1919	604,706	68,614,002	492,326	10,812	9,372		
1920	832,172	71,443,396	486,698	8,846	243,836		NA
1921	515,632	30,610,173	495,179	4,650	4,916,418		
1922	389,367	47,962,123	1,132,304	11,972	8,560,525	247,793	
1923	1,189,570	87,935,334	935,729	19,151	6,307,412	610,709	
1924	2,022,196	109,117,018	906,521	29,850	6,094,613		
1925	1,940,737	116,379,978	1,079,733	32,008	7,103,853		81,923
1926	1,921,021	109,269,035	907,292	35,382	3,868,259		2,004,934
1927	1,838,665	106,351,930	781,989	32,651	4,031,433		3,288,162
1928	1,785,793	115,570,399	684,006	32,711	4,277,156		3,049,450
1929	2,058,231	127,605,697	625,795	34,149	2,259,967		2,325,857
1930	1,475,296	84,195,921	433,666	19,202	233,696		12,620
1931	916,661	71,898,500	639,336	20,543	511,709		
1932	275,959	52,221,461	1,069,739	22,144	801,351		
1933	330,734	58,831,552	1,348,704	30,680	211,257		
1934	526,996	74,999,933	2,384,697	47,892	32,190		
1935	578,342	66,173,469	2,659,295	53,300			
1936	795,946	80,886,235	3,126,224	63,465	537,606		
1937	967,688	105,422,876	3,238,748	60,102	333,560		
1938	848,491	92,461,832	2,449,084	49,857	28,994		
1939	907,669	101,251,659	2,396,088	50,519	254,225	16,345	
1940	1,010,819	103,429,050	2,150,153	53,560	104,776		
1941	1,081,824	109,002,810	2,369,170	52,813	4,262		
1942	1,113,445	106,247,852	2,250,971	53,664	35,154	68,941	
1943	1,135,664	103,045,553	2,120,470	53,341	1,280,632	2,108,249	797,671
1944	690,963	58,032,712	1,366,516	34,154	5,995,166	14,589,506	
1945	363,588	18,770,550	799,809	12,354	16,079,710	34,663,270	
1946	260,000	7,160,507	720,466	4,745	18,071,704	41,631,007	
1947	558,325	33,326,999	1,429,820	19,592	21,307,917	56,788,448	
1948	521,809	37,605,506	1,349,631	18,715	17,594,329	46,933,556	
1949	420,367	18,992,772	1,072,925	11,495	20,767,088	56,838,463	
1950	372,589	26,493,806	1,011,354	13,202	11,429,116	32,949,358	
1951	530,921	54,385,795	1,265,338	24,890	2,514,762	7,392,450	
1952	541,487	54,871,531	1,217,149	26,319	2,845,494	7,820,577	
1953	589,785	58,658,416	1,237,969	29,129	711,399	1,766,719	
1954	2,246,642	84,018,951	1,353,256	39,210			
1955	4,977,631	116,288,346	1,181,291	42,035			
1956	5,706,169	144,160,138	1,235,621	44,714			
1957	5,080,602	146,779,474	1,149,526	48,508			



E & M J Annual Average Metal Prices—1897 to 1957

Year	COPPER		LEAD Common N. Y.	ZINC Prime Western (b) E. St. Louis	TIN (c) N. Y.	SILVER (c) N. Y.	QUICK- SILVER (f) N. Y.	ALUM- INUM Ingot
	(a) Domestic Refinery	Foreign Refining						
1897	11.29		3.880	4.120	11.07	59.290	38.50	39.00
1898	12.03		3.780	4.570	15.70	58.260	40.73	30.58
1899	16.67		4.470	5.750	25.12	59.580	43.63	32.72
1900	16.14		4.350	4.390	29.50	61.230	51.00	32.71
1901	16.11		4.330	4.070	16.74	58.950	47.00	33.00
1902	11.916		4.069	4.840	26.79	52.100	48.03	33.00
1903	12.245		4.237	5.191	28.09	53.570	41.31	33.00
1904	12.813		4.309	4.931	27.99	57.221	41.00	35.00
1905	12.590		4.707	5.700	31.358	60.452	38.50	35.00
1906	15.278		5.657	6.048	39.819	66.791	40.90	35.75
1907	21.064		5.325	5.812	38.160	75.237	41.50	45.00
1908	13.298		4.208	4.378	29.455	62.864	44.84	28.70
1909	12.982		4.273	5.352	29.725	51.502	46.30	22.00
1910	12.758		4.546	5.370	34.133	55.456	47.66	22.25
1911	17.376		4.920	5.608	42.281	63.194	46.54	20.07
1912	16.311		4.471	6.799	46.090	60.835	42.46	22.01
1913	15.206		4.370	5.504	44.752	59.791	39.54	23.64
1914	13.662		3.862	5.061	34.301(d)	54.811	48.31	18.63
1915	17.275		4.673	13.054	38.590	49.684	87.01	33.98
1916	27.202		6.858	12.634	43.480	65.661	125.49	60.71
1917	27.180		8.787	8.813	61.802	81.417	106.30	51.59
1918	24.628		7.413	7.890	88.750	96.772	123.47	33.53
1919	18.691		5.759	6.988	63.328	111.142	92.15	32.14
1920	17.485		7.957	7.671	48.273	100.900	81.12	32.72
1921	12.502		4.545	4.653	29.916	62.684	45.46	21.11
1922	14.382		5.734	5.716	32.534	67.328	58.95	18.68
1923	14.441		7.267	6.607	42.604	64.873	66.50	25.41
1924	13.024		8.097	6.344	50.176	66.781	69.76	27.03
1925	14.042		9.020	7.622	57.894	69.065	83.13	27.19
1926	13.785		8.417	7.337	65.235	62.107	91.90	26.99
1927	10.920		6.785	6.242	64.333	56.370	118.16	25.40
1928	14.570		6.305	6.027	50.427	54.176	123.51	24.300
1929	16.107		6.833	6.512	45.155	52.993	122.15	24.300
1930	12.982		5.517	4.556	31.684	38.154	115.01	23.787
1931	8.116		4.243	3.640	24.467	28.700	87.35	23.300
1932	5.555		3.180	2.876	22.017	27.892	57.93	23.300
1933	7.025	6.713	3.869	4.929	39.110	34.727	59.23	23.300
1934	8.428	7.271	3.864	4.158	52.191	47.973	73.87	23.300
1935	8.648	7.538	4.065	4.328	50.426	54.273	71.99	20.000
1936	9.474	9.230	4.713	4.901	46.441	45.087	79.92	20.000
1937	13.167	13.018	6.009	6.519	54.332	43.883	90.18	19.917
1938	10.009	9.635	4.739	4.610	42.301	43.225	75.47	20.000
1939	10.965	10.727	5.053	5.110	50.323	35.982	101.94	20.000
1940	11.206	10.770	5.179	6.335	49.827	34.773	176.86	18.691
1941	11.797	10.901	5.793	7.474	52.018	34.783	185.02	16.500
1942	11.775	11.684	6.481	8.250	52.000	38.333	196.35	15.000
1943	11.775	11.700	6.500	8.250	52.000	44.750	195.21	15.000
1944	11.775	11.700	6.500	8.250	52.000	44.750	118.36	15.000
1945	11.775	11.700	6.500	8.250	52.000	51.428	134.69	15.000
1946	14.820	14.791	8.169	8.726	54.544	40.151	98.24	15.000
1947	20.928	21.621	14.673	10.500	77.949	71.820	83.74	15.000
1948	22.038	22.338	18.041	13.589	99.250	74.361	76.49	15.731
1949	19.202	19.421	15.369	12.144	99.336	71.950	79.46	17.000
1950	21.215	21.569	13.296	13.806	95.519	74.169	81.26	17.713
1951	24.260	26.218	17.500	18.060	127.077	89.368	210.13	19.000
1952	24.230	31.788	16.467	16.215	120.475	84.941	199.097	19.410
1953	28.798	30.845	13.484	16.855	95.845	85.188	193.032	20.931
1954	29.694	29.839	14.054	16.661	91.838	85.250	264.386	21.784
1955	37.401	39.115	15.138	22.299	94.735	89.099	290.348	23.668
1956	41.818	40.434	16.013	13.494	101.409	90.625	259.923	26.010
1957	29.576	27.157	14.658	11.356	96.261	90.920	246.978	27.515

U. S. CENTS PER POUND—QUICKSILVER—DOLLARS PER 70 LB. FLASK

(a) Lake copper 1897-98, domestic market since 1935.
 (b) New York delivery 1898-1902, 100% zinc, 1897 to 1936,
 inclusive. Straits quality the rest. (c) Average for 11
 months. (d) New York market quotations in cents
 per lb., except for silver, which is in cents per troy oz., and
 (e) quicksilver, which is in dollars a per flask of 76 lb. See
 opposite page and reverse for weekly average prices for 1957.
 See opposite page and reverse for weekly averages.



TABLE NO. 5

Gold Prices

1834	Congress decreed that the gold dollar shall contain 23.2 grains instead of 24.75 or a value of \$20.67 per ounce.
September, 1931	Great Britain went off the gold standard.
April 19, 1933	United States went off the gold standard.
October 25, 1933	Reconstruction Finance Corporation began buying newly mined gold at arbitrarily fixed prices and purchases were extended to foreign markets at \$32.36 per ounce.
January 16, 1934	Federal Reserve Bank began paying depositors the United States price of \$34.45.
January 30, 1934	Gold Reserve Act changed the gold dollar from 25.800 grains to 15.238 grains at 0.9 fine or the gold content from 23.220 to 13.714 grains which was equivalent to a reduction of 40.94%. Gold immediately became valued at \$35.00 an ounce or \$34.9125 net after a 1/4% reduction from the \$35.00 figure.



Table No. 5

Silver Prices - Refer to New York Prices by Years

June 19, 1934	Silver Purchase Act permitted nationalization of silver, to acquire reserves equivalent to one-third of the gold reserves at prices fixed by Presidential proclamation but not to exceed \$1.29 per ounce.
December 2, 1933	President established price for newly mined domestic silver at 64.6465 cents.
April 10, 1935	Price increased to 71.11 cents.
April 24, 1935	Price increased to 77.57 cents - seignorage charges increased from 40 to 50% of the statutory or monetary price of \$1.29.
December 31, 1937	Two hours before expiration of London silver agreement adapted in 1933 by 66 nations for international cooperation to stabilize the price of silver, the President extended the price of 64.64 cents for newly mined silver to December 31, 1938.
May 6, 1942	Treasury department provided up to one billion troy ounces of its free silver stocks (Metal not held against silver certificates) for release in the form of loans and slightly less than 5 million ounces recovered from melting and coining was made available to industrial users with high priorities at 45 cents.
December, 1942	Secretary of Treasury authorized silver for coinage to be supplied Great Britain, Australia and certain other countries on a lend lease basis. In 1943 Great Britain was provided with 3,075,000 ounces.
July 12, 1943	Congressional act authorizing the sale of treasury stocks not required for redemption at a price of 71.11 cents for lease to war plants for a period not to exceed 5 years.
July 29, 1943	Revised W.P.B. regulations permitted treasury silver to be used for industrial purposes and foreign silver for health supplies, electrical contacts, etc. At this time the U. S. silver dollar had a silver content of 0.7734 oz. of silver, .900 fine.
July 1, 1946	Treasury's purchase price established at 90.5 cents per troy ounce, 1000 fine under an amendment to the July 6, 1939 Silver Purchase Act.



PHELPS DODGE CORPORATION - COPPER QUEEN BRANCH

ACCIDENTS - 1912 THRU 1950

<u>Year</u>	<u>Fatal</u>	<u>Serious</u>	<u>Slight</u>	<u>Total</u>	<u>Frequency/ 1000 Shfts.</u>	<u>Severity Percent</u>	<u>Total Acc. Undgrnd.</u>	<u>Ave. No. on Payroll</u>
1912	9	112	1131	1252	2.670		1229	2401
1913	9	56	1282	1347	2.776		1297	2591
1914	7	250	1322	1579	2.624			2232
1915	2	207	835	1044	1.603			1901
1916	1	153	894	1048	1.932			2053
1917	3	207	1966	2176	1.772			2276
1918	14	276	2033	2323	1.82			2343
1919	-	208	1509	1717	1.48			2276
1920	9	225	1446	1680	1.40			2663
1921	5	122	720	847	1.86			1364
1922	3	81	437	521	1.84			982
1923	5	175	572	752	1.195			1715
1924	6	180	524	710	.942			1983
1925	-	110	220	330	.570			1728
1926	1	55	68	124	.226			1696
1927	4	39	19	62	.117			1802
1928	2	25	8	35	.069		24	1892
1929	3	41	5	49	.051		26	2016
1930	2	24	3	29	.038		14	1547
1931	3	17	4	24			19	1088
1932	-	12	2	14	<u>Frequency/ Million</u>		11	906
1933	1	2	1	4	<u>Man Shfts.</u>		3	780
1934	2	19	3	24	8.02	3.202	17	918
1935	1	15	0	16	17.86	7.969	16	971
1936	4	48	2	54	15.13	2.178	47	1263
1937	0	48	17	65	12.14	2.822	54	1806
1938	1	30	5	36	8.60	6.025	32	1252
1939	3	22	4	29	10.07	2.826	26	1432
1940	1	30	9	40	23.10	7.279	39	1700
1941	3	72	18	93	19.94	3.305	86	1704
1942	2	56	25	83	19.78	3.012	70	1672
1943	1	64	21	87	20.38	6.776	75	1863
1944	2	42	17	61	21.18	5.856	53	1327
1945	2	25	13	40	16.90	0.771	38	838
1946	0	26	9	35	18.69	7.540	29	1020
1947	4	44	15	63	24.77	6.005	52	1485
1948	3	50	27	80	18.33	0.700	69	1430
1949	0	24	19	43	16.24	3.065	36	1051
1950	1	24	8	33			31	876

Note: Safety Department organized in 1913.

Bisbee, Arizona
January 1, 1958
C. E. Mills



COPPER QUEEN CONSOLIDATED MINING COMPANY

1909

Production totaled 596,235 tons with a gross copper content of 84,443,529 lbs. of copper; including 272 tons of precipitates, 73 tons of 9.35% copper ore shipped by leasors and 538 tons of 40.67% lead ore. Of this tonnage mined, 566,518 tons with a grade of 7.33% Cu., 1.033 oz. Ag and .0145 oz. Au., were treated at the Douglas Smelter and 28,834 tons of 2.17% low grade sulphides shipped to Old Dominion, Shannon Copper Company, Arizona United at Johnson and A.S. & R. at El Paso. The above production figures do not include 7670 tons of 2.62% slag and cleanup from Bisbee.

Development totaled 60,320 ft. including 37,313 ft. of drifts, 8050 ft. of sub crosscuts, 14,090 ft. of raises, 308 ft. of shafts and 559 ft. of winzes. New ore was opened up in several places, notably in the Uncle Sam on the lime contact with the western boundaries of the Sac Hill porphyry; in the 1408 drift close to the vertical sideline of the Del Norte claim owned by Superior and Pittsburg Company and on the 400 level under the creek in front of the hospital and close to the Dividend fault. Some work was also done within the main porphyry intrusion but no disseminated sulphide ore was found. J. M. Boutwell, a geologist with the U. S. Geological Survey made an examination of the property to assist in directing exploratory development and a geological department was organized.

Reserves were not estimated because with great bodies of soft decomposed material, locally known as ledge matter, heavy ground required close mining by square sets and development was limited to blocking out the sections being extracted. Timber consumption averaged 26.9 board ft. per ton.

Electric haulage was installed during 1908 on alternate levels from the 4th to the 16th, with transfer raises to each level above. With great lateral extent, tramping was formerly to five shafts by hand tramping and mules, which were first used underground in 1907. Motor haulage to the centrally located Sac shaft was now in progress. A central power plant was constructed midway between the Sacramento and Gardner shafts to furnish steam for the hoisting engines, compressed air and electricity for the Holbrook, Spray, Uncle Sam and Czar shafts. The Czar hoist uses electric power, the Holbrook and Spray are operated by compressed air and the Gardner by steam. Ore from the Lowell Shaft will also be tramped to the Sacramento Shaft which now has a depth of 1600 ft., is equipped with a steam condensing hoist handling 3 ton skips in balance and hoisting about 70% of the total production. On surface the ore is delivered to railroad cars by a belt conveyor system with an automatic sampler.

Pumping varied from 232 to 2427 GPM with an average of 454 GPM. The Czar made the most water and averaged 272 GPM with a lift of 440 ft. The highest lift was in the Lowell Shaft where an average of 85 GPM was pumped vertically 1419 ft. For handling acid water, the pump columns are lined with wood.

Outside exploration included a joint project with Cananea Consolidated in driving a tunnel into the Eureka claim owned by Sierra de Cobre Company and later transferred to Cananea Consolidated. Prospecting was also done on a deposit of chalcopryite on ground owned by West Cananea Copper Company but the work was discontinued and the option surrendered. At Courtland considerable work was done under option on property adjacent to the Great Western Copper Company and C & A with discouraging results. Extensive examinations were made of the quartz deposits of the Sitrué Mines Company in the Huachucas and the Hearst property in the Winchester



1909 (Cont)

mountains west of Wilcox. In Chihuahua, Mexico the mines of the Las Vigas Copper Company were unwatered and the results of a small amount of prospecting did not justify its purchase.

The hospital had a staff of six physicians and operated at a loss of \$10,609, largely due to maintenance from subsidence which necessitated moving, enlarging and modernizing the present building. An Employees Benefit Association was inaugurated for day's pay employees based on the International Harvester plan. Contributions were 2.0% of the employee's monthly wages with the Company contributing \$15,000 annually if 50% joined the plan or \$25,000 if 75% signed up. During 1909 employees averaged 1703 with 1366 underground and 337 on surface.

The administrative staff and officers were James Douglas, President; Walter Douglas, Manager; S. W. French, Assistant General Manager; Gerald Sherman, Superintendent of the Mining Department; P. L. Woodman, Mine Superintendent and Dr. F. E. Shine, Head Surgeon.

1910 (Manager's Report Missing)

Production totaled 596,235 tons with a gross content of 76,428,908 lbs. of copper and with an average grade of 6.40% Cu., 1.02 Oz. Ag and 0.021 oz. Au. This total production includes 557 tons mined by leasors, 600 tons of low grade sulphide shipped to the Arizona United Smelter at Johnson and 262 tons of precipitates shipped to Douglas.

A large percentage of the mining was on the fringes of known ore bodies with increased costs and 26.9 bd. ft. per ton including 19.6 bd. ft. used in the stopes. Smaller sized timber and reclaiming of timber before gobbing was tried to a minor extent. Mining costs of ore delivered to surface averaged \$5.230 per ton including \$2.137 for stoping, \$1.145 for development and \$0.379 for taxes and general expense.

Development totaled 59,806 ft. with 35,514 ft. of drifts; 11,101 ft. of intermediate or sub crosscuts; 12,447 ft. of raises; 132 ft. of winzes; 408 ft. of shafts and 2204 ft. of surface tunnels. The Lowell shaft is being sunk to the 1600 level with a connection to be made to the 1300 winze. Recent work from the 1200 to the 1600 levels indicate that the limestones extend nearer Sac Hill on the east and southeast than had been expected. New ore was developed near the Del Norte claim on the 1500 and 1600 levels; on the Hard Scrabble claim and from the Uncle Sam shaft. In the Sac shaft area a drift on the 400 level with a raise under a mineralized surface showing and a surface tunnel from the opposite side of the hill, indicated 2.0% porphyry with some 4.0% ore.

In March, ore from the Lowell was trammed to the Sac shaft and hoisting of ore at the Lowell shaft discontinued. After using compressed air for the Spray and Holbrook hoists, the Lowell and Gardner hoists were changed to air and the Lowell steam plant shutdown in August. Power used as power averaged 7661 KW hrs. per day and use of compressed air 5334 cu. ft. per minute of which 1000 CFPM was used on 5 main hoists.

In July a fire started in an old stope in the 300-48 country in a sulphide stope from spontaneous combustion but was controlled and limited to charring of timber. Pumping varied from 164 to 1730 GPM with an average of 317 GPM. The Holbrook makes very little water which is pumped to the Czar and water from the Sac is pumped to the Lowell shaft where it is lifted to surface.



1910 (Cont)

The number of employees averaged 1724 with 1375 directly connected with mining, 54 on hoists, pumpmen and mechanical maintenance and 295 in the shops and surface crews. A system of insurance for time off due to accidents or sickness or death was started the first of the year and 80.4% exclusive of Mexicans accepted the plan.

1911 (Manager's Report Missing)

Production totaled 619,163 tons containing 74,499,453 lbs. of copper. Shipments to the Douglas Smelter amounted to 588,527 tons of 6.21% copper ore; 12,897 tons of 1.64% sulphide was shipped to Old Dominion and A.S. & R.; lessees mined 2,240 tons of 10.17% ore; a special lot of 40 tons from the Czar had a grade of 36.0% copper and precipitates from mine waters totaled 377 tons at 47.14% copper. Also included in the total production figure are 3723 tons of ore with 47.25 oz. of silver shipped to Douglas and 11,539 tons of low grade lead ore carrying 31.51 oz. of silver was shipped to A. S. & R.

Mining of 601,424 tons of copper ores cost \$4.881 per ton including \$2.042 for stoping, \$1.172 for development, \$0.686 for tramming and hoisting, \$0.544 for repairs and \$0.304 for taxes and general expense. Timber consumption averaged 23.3 bd. ft. per ton with 16.6 bd. ft. used in stopes. Some mining was done by vertical slicing and the use of 8 by 8 in. timber was expanded.

Development totaled 62,150 ft. and included 34,637 ft. of drifts, 9602 ft. of sub crosscuts, 15,766 ft. of raises, 121 ft. of winzes, 1338 ft. of shaft and 686 ft. of surface tunnels. Diamond drilling was started with an advance of 686 ft. Sinking of the Lowell Shaft was continued to the 1600 level and a connection made with the Sacramento. Sinking of the Dallas shaft started April 11 by contract and connected with a 163 ft. raise driven from 1100 level on December 8. Sinking continued below the 1100 level with creosoted Oregon Pine being used for shaft timber. Charges to the Dallas shaft appropriation No. 43 amounted to \$17,896.37.

Development work in the Uncle Sam traced the main ore body to the 200 level and sulphide ore was found on the 200 level under the Southwest stopes. In the Spray a series of sulphide beds from 3 to 10 ft. in thickness were found in the Abrigo limestone between the 700 and 800 levels. The country in the Galena and Morning Star claims immediately north of the Del Norte is developing and producing good tonnage. Leasors found a rich body of gold-silver ore with a little lead near the Uncle Sam shaft. Very little work was done to explore the southeast end of the Sac Hill porphyry but a broad fracture zone was cut on the 200 level which may be traced from near the Neptune tunnel across the hill to the 300 drift off the Sacramento shaft. Exploration of 1073 ft. at the White Tailed Deer was without encouraging results. The geological Department in charge of Arthur Notman was chiefly responsible for the proper projection of exploratory work.

A total of 8.5 miles of trolley haulage is in use and a storage battery loco with Edison cells has been tried at the Uncle Sam but lacks draw bar capacity. Hand tramming averaged 229 ft., mule haulage 646 and trolley haulage 2669 ft. In June an agreement was made with Calumet and Arizona Mining Company for them to handle water from the Sacramento and Lowell by their Junction pumps based on previous costs plus an allowance of \$2,000 per month to drain the Lowell Basin. The volume of water pumped varied little from the previous year.



1911 (Cont)

In January a fire in the old 1200-3 stopes near the Lowell shaft was apparently under control but in June, caving of the exhaust raise to surface backed the gases into the shaft on the 400 and 800 levels. Handling of men was discontinued and hoisting limited to waste and supplies. In October the shaft became impassable and was then reopened by a helmet crew under the direction of C. A. Mitke of the Stag Canyon Fuel Company. In October a fire broke out in the 300-55 stopes at the Holbrook in an abandoned and inaccessible area. It was sealed off from active workings and it, as well as the Lowell fire, was believed to be controlled and not spreading. The cost of fighting fires was equivalent to 10.7 cents per ton of ore mined, exclusive of added costs in lowering the Lowell underground employees through the Gardner and Sacramento shafts for six months.

In August certain classes of underground labor were increased from \$3.50 to \$3.75 per day equivalent to an increase of 7.21 cents per ton mined. The number of men working underground averaged 1505 during the year 1911.

1912

Production from all sources totaled 786,368 tons containing 88,280,908 lbs. of copper, the highest production rate since operations commenced. Shipments to the Douglas Smelter totaled 744,578 tons with a copper content of 87,741,280 lbs. and included 669,399 tons of copper ores with a grade of 6.08% Cu., 0.98 Oz. Ag., .0202 oz. Au.; 9411 tons of 23.14% ore mined by leasors; 64,770 tons of slag from the Czar, the lower dump and smelter cleanup, with a grade of 2.31% copper and 998 tons of 51.94% precipitate. Clean sulphide shipped to the smelter at Globe amounted to 30,164 tons containing 1.19% copper. Of 11,626 tons of lead ore shipped to El Paso, 10,161 tons were mined by leasors with 2,953,685 lbs. of lead being paid for.

Mining costs averaged \$5.561 per ton including \$2.236 for stoping, \$0.772 for tramming and hoisting, \$1.320 for development, \$0.655 for repairs and miscellaneous, \$0.071 for mine fires and \$0.487 for taxes and general expense. Some tonnage was mined by cut and fill and several stopes on the Dividend and Holbrook claims by top slice. Consumption of timber totaled 22.2 bd. ft. per ton with 14.9 bd. ft. being used in stoping.

Development included 58,201 ft. of drifts, raises 18,816 ft., winzes 166 ft., shafts 918 ft., surface tunnels 34 ft. or a total of 78,135. The Dallas shaft was completed to the 1400 level and the Sac waste shaft 193 ft. to the 200 level. On the Silver Bear, a prospect shaft was sunk 153 ft. and 240 ft. of crosscuts driven. At the Wade Hampton lessees followed Pb-Ag-Au ore down 200 ft. on the dip and preparations were made to sink a shaft on this showing. A bond was taken on a group of claims on the north side of Mule gulch and 5 churn drill holes or 2412 ft. of prospect holes drilled without encouraging results.

A new ore body on the Dividend and Holbrook claims adjoining the Dividend fault was estimated at 300,000 to 500,000 tons at 5.0% and extending from above the 200 level to below the 500 level. Ore in the Morning Star and Little New York claim was estimated to contain 300,000 tons of 6.0% ore and about 200,000 tons of 7.0% copper ore was developed west of the Del Norte on the Auburn and Del Mar claims. Exploration in the Sac Hill porphyry was most striking on the 200 level with 775 ft. or about 300,000 tons of milling ore exposed. Approximately 28,500 ft. of the development work was in the Spray division. At the Uncle Sam a body of oxide-carbonate ore about 150 by 250 ft. was found south of the shaft on the Hardscrabble claim.



1912 (Cont)

With 8.3 miles of trolley, motor haulage averaged 2452 ft. per car trammed, mule haulage 626 ft. and hand tramping 210 ft. Regular shipments to the Douglas Smelter were hoisted through the Sac shaft and 51,201 tons of special sulphide and lead ores hoisted through other operating shafts. A new Nordberg geared compound condensing hoist was ordered for the Sac shaft to handle three deck cages in balance and at the central power plant two boilers were added to the existing five and a 7000 cu. ft. compressor purchased. A new change room was constructed at the Uncle Sam and for the Gardner division, two 35,000 cu. ft. fans were ordered to ventilate this hot division. The Holbrook and Lowell fires, which were burning as of the first of the year gave no trouble and later the Holbrook fire was extinguished.

Employees averaged 2401 with 2063 underground and 338 on surface. In addition to this number, a staff of 21 in the hospitals and 30 in miscellaneous departments served both the mine and the smelter with 1010 on the payroll. The Employees Liability and Compulsory Compensation Law, which was thought to be unconstitutional, became effective September 1. The Employees Benefit Association was then continued on a more limited basis of benefits with membership down to 49.7%. Eight-hours collar to collar was also put into effect, employees working 9 hours were reduced to eight and a wage increase given to the 8 hour employees. Semi-monthly payment of wages had been put into effect previous to the new regulation. On Sept. 1 an increase of 25¢ per shift was given to underground employees.

Valuation increased from \$313,216 in 1900 to \$11,890,011 in 1912 with a corresponding increase in taxes from \$13,158.08 to \$248,108.02 exclusive of school taxes estimated at \$24,000 and city taxes for Bisbee and Douglas, estimated at \$17,000.

On June 1, Joseph P. Hodgson from Ispeming, replaced P. L. Woodman who resigned from the position of Mine Superintendent. Personnel included Walter Douglas, General Manager of Phelps Dodge & Co. and S. W. French, Manager of the Copper Queen Consolidated; G. W. Dowell, Asst. General Manager; Gerald Sherman, Superintendent of the Mining Department and Arthur Notman, Geologist.

1913

Production from all sources totaled 867,481 tons containing 97,181,725 lbs. of copper. Shipments to the Douglas Smelter included 712,444 tons of copper ores with a grade of 6.24% Cu., 0.956 oz. Ag and 0.0203 oz. Au.; 21,524 tons of 7.95% ore mined by leas rs; 603 tons of 36.24% precipitates; 94,212 tons of 1.94% slag and 44 tons of flue dust. Of 15,573 tons of lead ores shipped to El Paso and which yielded 5,701,628 lbs. of lead, 773 tons was mined by lessees. Lead ores yielded an average profit of \$8.61 per ton. Shipments to Globe continued with 18,316 tons of 0.92% clean sulphide used to give a balanced smelter feed. Slag cleanup was from the newer portion of the Bisbee dump, the older and higher grade portion not being reclaimed because of precipitation launders. Net profit from the 94,212 tons recovered was estimated at \$2.227 per ton.

Mining costs per ton, averaged \$6.502 per ton including stoping \$2.381; tramping and hoisting \$0.811, development \$1.813, repairs and miscellaneous \$0.701, taxes and general expense \$0.670. Where possible small sets of 8 x 8 inch timber were used. Consumption totaled 25.9 bd. ft. per ton with 16.1 bd. ft. used in stoping. Square set mining accounted for 88.11% of the tonnage, 2.96% from top slice, 8.38% from cut and fill and 0.55% from shrinkage stopes. The small amount of top slicing was in the Neptune and Czar. Appreciable tonnage was mined from areas which were started about 25 years ago. There were seven operating divisions in addition to the White Tailed Deer.



1913 (Cont)

In the limestone areas, development work totaled 92,780 ft. including 67,692 ft. of drifts, 23,512 ft. of raises, 885 ft. of shafts, 176 ft. of winze and 515 ft. of surface tunnels. Progress in the Sac Hill porphyry totaled 7362 ft. or 5244 ft. of drifts, 1499 ft. of raises, 37 ft. of winze and 582 ft. of surface tunnels. Underground work in the porphyry was stopped in September and further outlining of ore started by churn drills. During the year 3529 ft. were drilled for the Czar slice, 701 ft. for extinguishing the Holbrook fire area and 5946 ft. for developing the limits of porphyry ores.

The Uncle Sam shaft was sunk 213 ft. to a depth of 822 ft. with the bottom level at the same horizon as the Czar 400 level. The Silver Bear shaft was deepened 221 ft. to 465 ft. or the Spray 200 level and at the Wade Hampton a shaft was started and sunk 220 ft. with drifting on the 1st and 2nd levels with negative results. New ore discoveries were made by the Lowell 1055 drift and the Sac 1525 and 1529 drifts. Encouraging developments at the C & A Cole mine justified exploration in the Dallas area and discovery of ore and favorable surface showing in the Don Luis area were of importance. A drift was started on the 1000 level from the Gardner shaft to explore under the Spray 8-25 stopping area. Further work was done at the White Tailed Deer which produced 6385 tons from the surface down to the 1st level.

Ore reserves for the seven divisions and the White Tailed Deer were estimated at 2,567,928 tons plus 211,199 tons of lean sulphide. Porphyry ores in the Sac hill area were estimated at 1,350,000 tons with a grade of 3.53% copper.

Outside exploration included 5141 ft. in the Copper King group of claims and at the Hanover mine \$53,588.62 was spent in sinking a shaft to the 400 level and driving 1393 ft. of development headings on the 200 and 400 ft. levels. A small tonnage of ore was shipped from this property by leasors.

Tramming with 9.6 miles of trolley averaged 2484 ft. per car trammed, mules 720 ft. and hand tramming 214 ft. Work in the Lowell fire zone included reopening and repairing of air courses leading to surface. The Holbrook 400 and 500 level fire areas remained hot with gas on the 600 level. Water introduced through two churn drill holes improved conditions immensely.

The sum of \$220,328.73 was spent on construction. Change rooms were erected at the Sac and West Atlanta; a new precipitation plant built near the Sac shaft; plans drawn for a saw mill at Don Luis and an experimental concentrator is being erected for milling porphyry ore. The new service hoist ordered in 1912 was installed at the Sac shaft and a fifth compartment is being raised for cables and pipe columns. Two electric hoists were ordered for the Czar and Uncle Sam shafts.

Employees averaged 2569 during 1913 with an additional 22 in the hospitals and 30 miscellaneous serving the mine and smelter where the payroll averaged 1040. The State Compensation law was most unsatisfactory because of claims for trivial injuries. With 2062 accidents, 303 claims were processed costing \$24,678.35 for injuries and \$17,414.00 for 9 fatalities. The Employees Benefit Association continued in operation paying \$37,674.58 in sickness and accident benefits and with a Company contribution of \$7,500 the fund had a remaining balance of \$17,503.07. With declining membership a solicitor increased the Bisbee members from 50.0 to 69.1 percent of the eligible working force. Wages in the \$3.75 occupational classifications were increased to \$4.00.



1913 (Cont)

A Safety Organization was started and safety rules drawn up. First aid instructions based on Red X methods were given to a first aid corp. McKerhan was placed in charge of mine rescue work and ladders were changed from vertical to incline. New hires were required to pass a physical examination.

The underground operations were under the supervision of J. P. Hodgson, Mine Superintendent and E. Finity and Frank Sinclair, Mine Foremen. George Mieyr served as Master Mechanic. Walter Douglas continued as General Manager, Stuart W. French as Manager at the Copper Queen Consolidated and Forest Rutherford as Smelter Superintendent.

The Douglas Smelter produced 133,410,582 lbs. of copper as bullion, 76.4% of which was from Bisbee ores and cleanup. An average of 8.08 blast furnaces smelted at a rate of 343.5 tons per furnace day; 5.97 roasters averaged 56.5 tons; two reverbs averaged 1.71 per operating day at 289.6 tons per unit and seven basic lined converters averaged 6.5 stands per day.

1914

Production totaled 732,829 tons containing 86,066,143 lbs. of copper. Of this total, 697,258 tons with a copper content of 85,300,775 lbs. was shipped to Douglas and included 674,365 tons with a grade of 6.15% Cu., 1.027 oz. Ag., .0202 oz. Au mined by the Company; 10,807 tons of 7.14% ore mined by leasers; 11,502 tons of 2.04% slag and 584 tons of 30.38% precipitates. Included in the copper ores shipped to Douglas, 8838 tons of 2.64% siliceous ore was used for converter flux. Shipments of 1.40% lean sulphide to Globe amounted to 5098 tons; 3393 tons of 1.37% porphyry was sent to the experimental leach plant and 3150 tons of 2.07% porphyry treated in the pilot concentrator. Of 23,930 tons of lead ores shipped to El Paso and which yielded 8,889,175 lbs. of lead, 626 tons were mined by leasers.

Mining costs averaged \$5.463 per ton including stoping \$1.728, tramping and hoisting \$0.796, development \$1.339, repairs and miscellaneous \$0.642, taxes and general expense \$0.666 or mining costs of 4.483¢ per pound of copper. Lead-silver ores, mined mostly in the Southwest and Gardner and shipped to El Paso netted a profit of \$6.68 per ton. Tonnage mined by top slice increased to 13.9% with eight ore areas being prepared for this method and most of the tonnage during 1914 coming from the Neptune and Czar slices. Cut and Fill stopes in the Holbrook and Gardner accounted for 8.2% of the tonnage, shrinkage 1.8% and square set 76.1%

With lower copper prices production was curtailed and the Uncle Sam and Spray, which were high cost divisions, were shut down with future mining in the Spray to be worked from the Holbrook and Gardner. In August the Southwest and Queen incline stopes were shut down but later, mining of lead ores was resumed in the Southwest. All leases were cancelled during the latter part of the year and in addition to a decreased working force, more employees were used in mining lead-silver ore.

In the limestone areas development totaled 71,352 ft. and included 27,809 ft. of drifts, 23,228 ft. of raises, 234 ft. of shafts and 81 ft. of winzes. A great many minor discoveries were made but no new large ore bodies discovered. Erratic occurrences of primary ore were found in the Gardner 1057 and 1065 drifts; ore was found in the Junction on the Ormand claim near the Virginia sideline; the Czar shaft area remained partially explored and the results of development work in the Dallas and Wade Hampton were disappointing. Ore reserves as of 1-1-1915 were estimated at 3,091,939 tons of smelting ores and 257,077 tons of lean sulphide.



1914 (Cont)

Development work in Sac Hill was very encouraging and included 1397 ft. of drifting, 536 ft. of raises and 19,402 ft. of churn drill holes. Reserves were estimated at 2,550,450 tons with 1,900,000 tons of 2.00% porphyry in the West End, 442,980 tons at 2.21% copper in the East End and 207,740 tons of probable ore below the 300 level. The experimental concentrator was put into operation in charge of August Sandberg, Consulting Metallurgist, in August and treated 90 tons daily by gravity separation with a 75.5% recovery and 6.5% concentrate. After installing a Rork flotation machine, recovery was increased to 87% with a 10.0% concentrate.

Motor haulage totaled 10.93 miles of trackage and 33 cu. ft. rocker cars were in general use. Heavy rains during December taxed the pumping capacity and after shutting down the Spray, the C & A allowed the small amount of mine water to drain into the Irish Mag with no charge for pumping. A Sturtevant 70,000 cu. ft. fan was installed at the Gardner and the two smaller fans which it replaced were moved to the Lowell and Sac 1400 and 1600 ft. levels. Two new Nordberg electric hoists replaced the obsolete units at the Czar and Uncle Sam shafts which were equipped with steel head frames. A 250 ton concrete lined loading pocket was constructed at the Sac shaft 400 level to facilitate hoisting which was at the rate of 1136 tons per shift. A one story 40 by 102 ft. brick wall frame construction dispensary was built at Bisbee for \$30,333.75. The Gardner saw mill was reconstructed to frame mine timbers instead of the contemplated framing shed at Don Luis and a central tool sharpening shop was also completed.

Prospecting continued at the Hanover mine, Fierro, New Mexico and \$50,767.92 spent on development. Shipments to Douglas were limited to 530 tons of 4.41% copper ore and further development discontinued.

Employees decreased from 2569 to an average of 2212 during 1914 and 20 hospital employees serving Bisbee and the Douglas smelter which averaged 946 employees. On August 15 a 10.0% reduction was made on salaries and day's pay rates because of the depressed condition of the copper market. The Employees Benefit Association continued to function with a membership of 80.3% of the Copper Queen Consolidated employees. The cost to employees averaged \$1.48 per month and the Company's contribution was equivalent to \$0.33. After paying out \$51,875.16 in benefits plus \$3,099.15 for operating expenses, the surplus diminished to \$5,700.48 at year end. The Safety Department worked with employees committees and the number of accidents was less than at other large mining companies in Arizona. Payments for injuries under the State Compensation Plan amounted to \$49,098.36 plus \$39,022.84 for 7 fatalities. A claim or adjustment bureau was established to handle disability claims. There were no changes in personnel; Walter Douglas continued as General Manager of the Phelps Dodge & Company properties and S. W. French as Manager of the Copper Queen Consolidated.

1915

Production totaled 830,777 tons containing 88,551,180 lbs. of copper. Mine production of copper ores totaled 739,116 tons with a grade of 5.65% Cu., 0.976 oz. Ag. and .0239 oz. Au and included 10,746 tons of 3.60% siliceous ores used as converter flux. Leasors mined 9956 tons of 5.65% copper ore; precipitates of 601 tons averaged 31.94% Cu.; 46,965 tons of 2.33% slag were reclaimed from the old Copper Queen dump and of 2681 tons of 2.60% lean sulphide, 2165 tons was shipped to Globe and 516 tons to El Paso. Lead-silver ores of 23,138 tons containing 8,811,651 lbs. of lead were shipped to El Paso, 239 tons of which was mined by leasors. The experimental concentrator treated 4407 tons of copper ores and 3913 tons of lead ores, and shipped



1915 (Cont)

1359 tons of 8.22% concentrates to the Douglas smelter and 971 tons of 29.70% lead concentrates containing 576,767 lbs. of lead to El Paso.

Mining costs averaged \$4.628 including \$1.296 for stoping, tramping and hoisting \$0.776, development \$1.037, repairs and miscellaneous \$0.525, taxes and general expense \$0.714; equivalent to 4.14¢ per pound of copper. Lead-silver ores netted a profit of \$5.96 per ton. Square set mining represented 65.9% of the stoping tonnage; top slicing, mostly in the Czar, Dividend and Gardner, was 18.7%; cut and fill 15.2% and shrinkage 0.2%. Consumption of timber averaged 17.6 bd. ft. per ton with 9.3 bd. ft. used in stoping. The Uncle Sam and Spray shafts continued inoperative but the Spray 8-25 stoping area was reactivated and worked through the Gardner. In the Czar considerable ore was found between stoped out sections on the 400 level.

Development work in the limestone areas totaled 68,431 ft. including 43,764 ft. of drifts, 24,549 ft. of raises and 118 ft. of winzes. In addition to the above figures, 9924 ft. of special drifts and raises were charged to stoping and 3772 ft. of development was for lead ores. An adit was driven from the old smelter site to the Southwest shaft for haulage of lead ores to the Czar loading trestle and for transportation of timbers and supplies to the Southwest shaft. A new drift on the Sac 1000 level was started to permit haulage of ore mined up to the 400 level and a drift on the 400 level connected with the bottom of the Uncle Sam shaft and will serve as a haulage way for stopes below the 200 level. No new ore bodies of appreciable extent were found. At the White Tailed Deer, 4975 tons mined during 1915 makes a total of 19,010 tons during the last 10 years and prospects justify sinking a shaft. The C & A found a small body of rich ore on the Sunnyside claim and followed it to our Tuscarora boundary. Ore reserves as of 1-1-1916 were estimated at 2,951,852 tons with a grade of 5.36% copper in 5 divisions and 7.27% in the 6th division plus 254,912 tons of lean sulphide.

Development progress in Sac Hill was by 2456 ft. of drifts, 712 ft. of raises, 39 ft. of winzes and 42,952 ft. of churn drill holes. Considerable ore was developed to the west of the East End porphyry ore which is near the Sac shaft and approaches the power house. With a 1.3% minimum grade reserves as of 1-1-1916 are estimated at 8,542,836 tons at 2.732% copper and with a 1.0% minimum grade the tonnage is estimated at 11,633,348 tons of 2.455% mill ore. In the pilot concentrator 4407 tons of 2.96% ore produced 1359 tons of 8.22% concentrate with a 3.24 ratio and 85.45% recovery. Following the test work on copper ore, 3913 tons of 9.8% Pb ore containing 6.1 oz. of Ag., were milled and produced 971 tons of 29.7% lead concentrate and 13.3 oz. Ag. with a ratio of 4.03; 75.3% of the lead and 54.3% of the silver was recovered. Test milling of lead ores resulted from high silica penalties under the El Paso contract.

Outside exploration was limited to assessment work on the Apache group in Pima County. At the Hanover mine in New Mexico a few cars of low grade ore were shipped by a lessee.

In the mine a few drifts were run on bonus to determine standards based on three ground classifications. Footage per man shift varied from 1.39 ft. in hard ground to 1.461 in soft with corresponding bonus per shift of \$.327 and \$.368 and with average costs of \$4.989 per ft. including timber and explosives. Haulage ways included 12.3 miles of trolley with a haul of 2845 ft. and 34.46 miles of lighter track with an average haul of 564 for mules and 197 ft. for hand tramping.



1915 (Cont)

The Nordberg hoist purchased in 1914 was installed at the Uncle Sam and a gasoline driven hoist ordered for the White Tailed Deer. At the Sac shaft a second concrete lined 250 ton shaft storage bin was constructed on the 1000 level and concreting of the shaft started on a one shift basis. Lining of 305 ft. was at a unit cost of \$53.08 per foot. A sprinkler system was installed in the Holbrook shaft for fire protection and a loading trestle built at the Czar for loading lead ores into railroad cars.

In October a small fire broke out in the Holbrook fire area at the 3-8-5 raise. On December 2 the Lowell 13-10 stope adjoining the old fire area broke out and discharged gas into the C & A mine workings. A hot spot in the Gardner near the 9-7-41 raise just below the 800 level caused gas to travel to the Irish Mag and temporary arrangements were made with C & A and lessees for the Irish Mag shaft as an outlet. Since the Holbrook fire, tailings from the cementation plant were pumped to the Holbrook for irrigating and leaching some of the old stopes.

Mine employees averaged 1883 during 1915 with 18 hospital employees serving Bisbee and the Douglas Smelter which had an average payroll of 965. Day's pay wages were increased 10% in January and based on a sliding scale of copper prices with a maximum of 20 cent copper. Salaried employees were given a 7-1/2% increase on May 1st. The wage scale for miners increased from \$3.60 to \$4.35 and averaged \$4.12 per shift. Absenteeism was very low and 64.7% of the underground workers did not miss a shift during the year. An employees committee of five was instituted and met with Dr. F. E. Shine, Superintendent and Chief Surgeon monthly to present suggestions and discuss hospital service complaints.

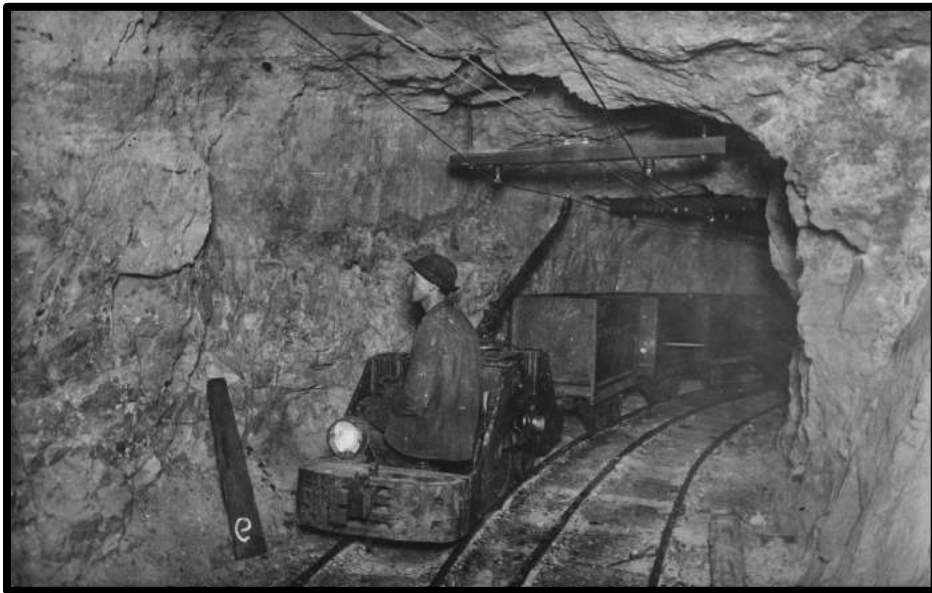
An appreciable reduction was made in accidents or from 1579 in 1914 to 1044 during 1915. Sixty-eight percent were classified as preventable and 32% as trade risks. Payments under the State Compensation Law amounted to \$41,026.88 or 1.2% of the payroll and \$34,028.08 was paid from the Employees Benefit Association Fund for sickness and injuries. Membership dues were increased from 1.3 to 1.75% and the Company's contribution from \$7,500 to \$15,000 annually. Lump sum payments were made to 16 employees, 9 of whom were suffering from tuberculosis. Pensions were granted to 9 employees during 1915 making a total of 25 now being paid; these payments amounted to \$11,124.70 during the year. Although the State Compensation Law is inefficient and unconstitutional, it does afford a basis for settlements without the uncertainties of law suits.

1916

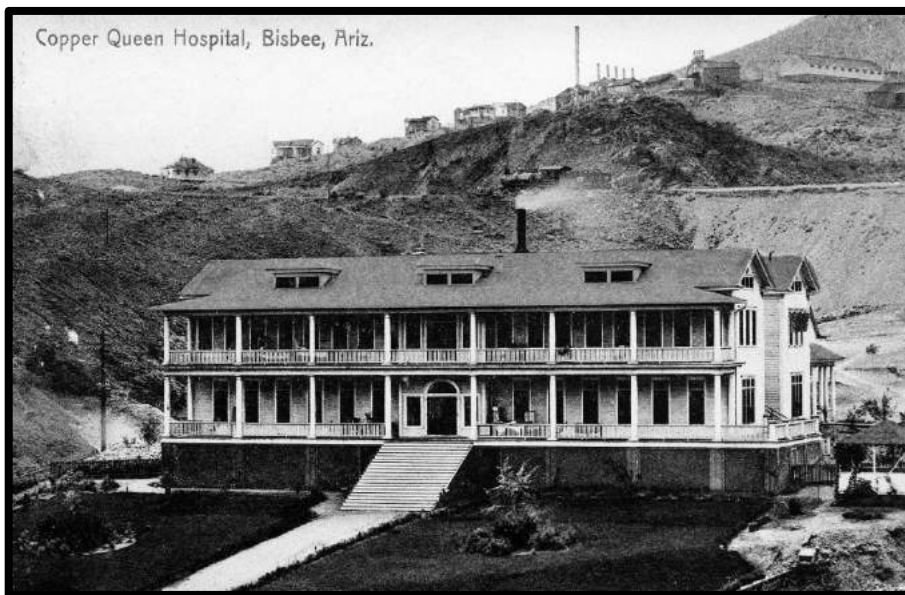
Production from all sources totaled 955,562 tons containing 102,685,722 lbs. of copper and 9,421,562 lbs. of lead from ores and concentrates. Company operated stopes mined 833,889 tons with a grade of 5.76% Cu., 0.885 oz. Ag and .0273 oz. Au., including 5510 tons of 2.55% siliceous ores used as converter flux. Lessees mined 19,390 tons of 4.89% copper ores; 73,657 tons of 2.13% slag was reclaimed from the old smelter dump and 765 tons of 42.89% precipitates were shipped to the Douglas Smelter. Production of lead ores totaled 24,889 tons of which 349 tons were mined by lessees. Of this tonnage 23,462 tons were shipped to El Paso and from 1427 tons milled in the experimental concentrator, 416 tons of 34.32% lead concentrates were also shipped to El Paso. From 2221 tons of porphyry ore milled in the pilot concentrator 399 tons of 5.66% copper concentrates were smelted at Douglas.

Mining costs averaged \$5.76 per ton including stoping \$1.873, tramping and hoisting \$0.961, development \$1.191, repairs and miscellaneous \$0.666, taxes and general





Electric locomotive pulling Koppel cars (see p.16, para.4)

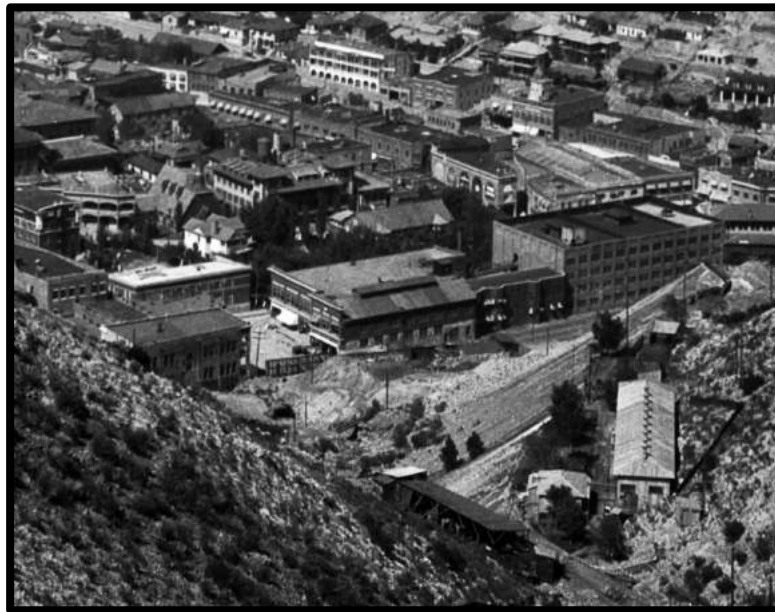


The Copper Queen Hospital with the Irish Mag Mine in the background. This hospital was heavily undermined by workings from the Holbrook Mine (see p. 17, para. 2)



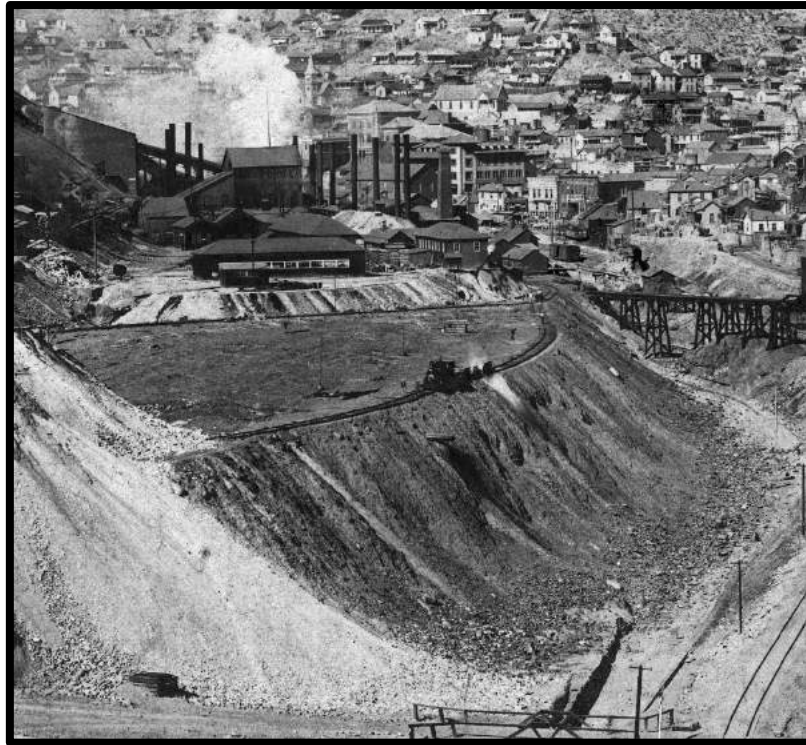


A corroded brass sign, notifying the employees that the company had complied with the workers compensation laws. It was nailed to the door at a blasting cap magazine on the 5th level, Southwest Mine (see p. 20, para. 2)

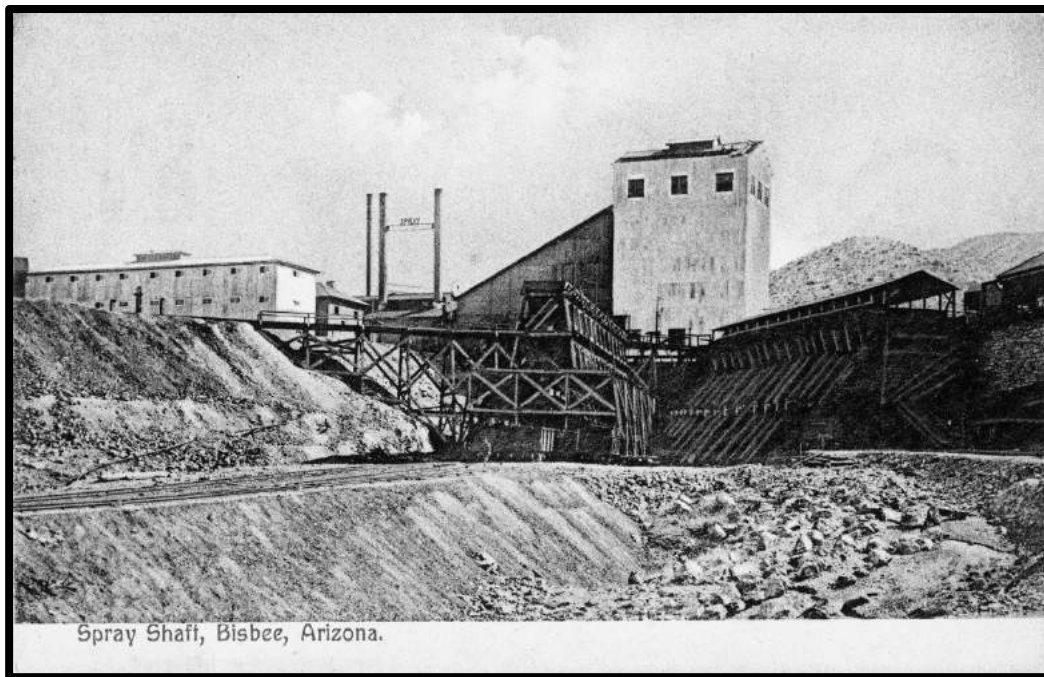


The West Atlanta change house, the long building in the lower right corner. Later, the West Atlanta would later be called the Southwest Mine. (see p.21, para. 6)





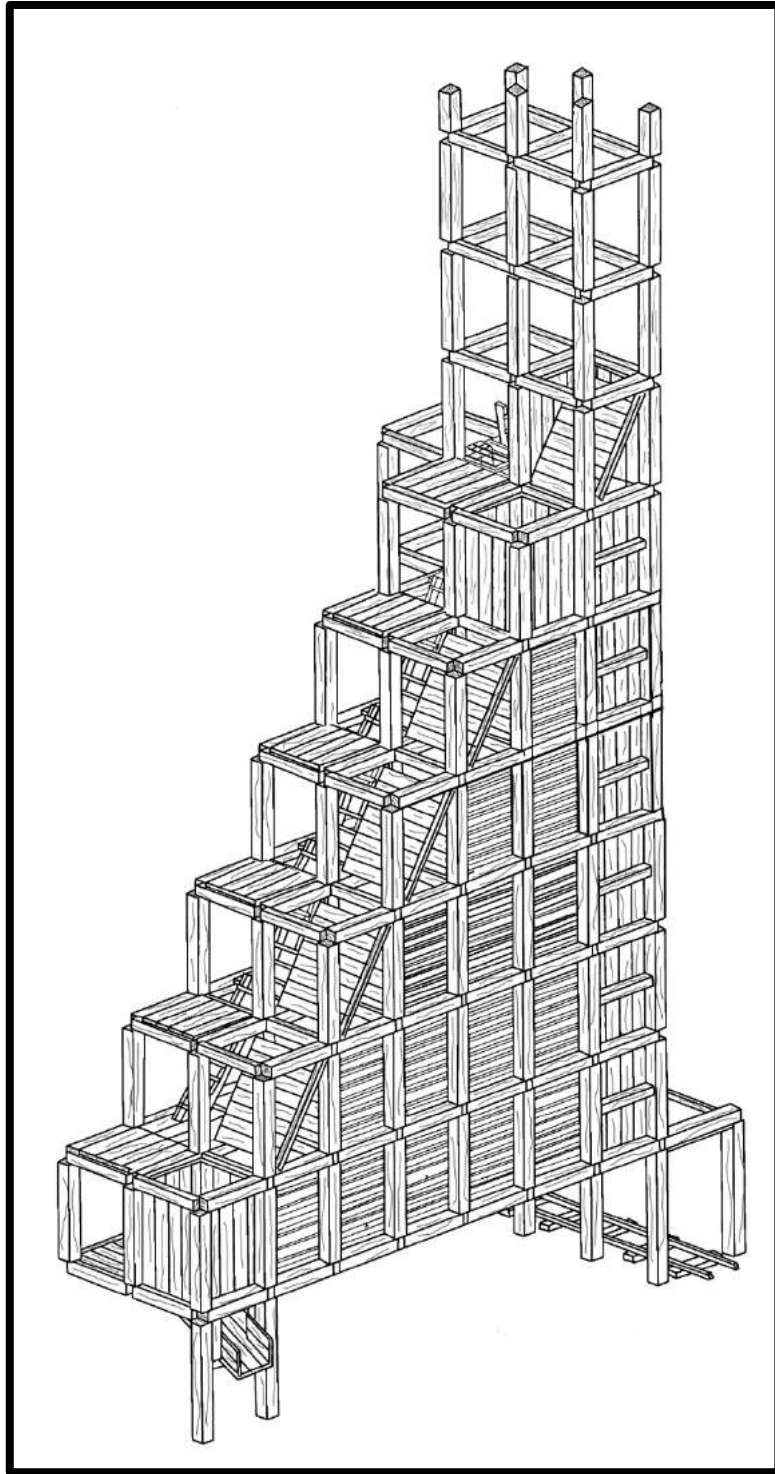
The active Copper Queen Smelter's slag dump. It still contained significant amounts of copper and was later mined and shipped to the more efficient smelter at Douglas, Arizona (see p.23, para. 5)



Spray Shaft, Bisbee, Arizona.

In 1914, the Spray Mine was shutdown. It was later mined under lease (see p. 22, paragraph 6)





Copper Queen Style square-set timbering (see p.24, para. 2)



1915 (Cont)

expense \$0.715 or a unit cost of 4.997 cents per pound of copper. Copper ores mined by lessees had a comparative cost of \$6.85 per ton. Stopping methods were 58.1% by square sets, 24.1% by top slice and 17.8% by cut and fill. Timber consumption averaged 18.1 bd. ft. per ton with 10.6 bd. ft. used for extraction. Timber costs increased to \$15.67 per M bd. ft. F.O.B. the West coast. Stopping efficiency decreased from 6.06 tons per man shift to 4.83 during 1916 or 1.66 for all underground men, partially due to intermittent stopping of sulphide stopes and increasing the tonnage of oxidized ores because of excess sulphur which restricted the smelter to 800 tons of sulphide ores per day.

With the current high price for manganese, some surface ores were mined by lease and by Company account. Profitable slag from the lower dump was exhausted and a small tonnage remains to be recovered from the Czar dump. The estimated profit realized from 73,657 tons during 1916 was \$6.30 per ton and \$4.87 to date for the entire 458,567 tons shipped to the Douglas Smelter.

Development in the limestone areas totaled 75,244 ft. including 40,896 ft. of drifts, 22,740 ft. of raises, 9541 ft. of intermediate crosscuts and raises, 304 ft. of winzes and 161 ft. of shafts. Additional work included 1402 ft. of headings for ventilation, fire fighting, etc., 9088 ft. of stope preparation and 1931 ft. of development in the lead areas. In the Southwest, rich carbonate ores were found by the 5-30 drift near the surface of the Copper King claim and in the 5-32 & 33 crosscuts on the Golden Gate claim. Primary sulphides were opened up in the Gardner on the 900 and 1000 ft. levels on the Keystone and Silver Bear claims; 30,000 tons of 7.0% ore were developed in thin beds of oxidized ore at the Dallas and in the Sac division new ore was developed by the 1622 and 1628 drifts and also on the 1300 and 1400 levels. The White Tailed Deer shaft was sunk 161 ft. and the crosscut on the first level encountered a second bed of ore. The Queen tunnel to the Southwest shaft is being extended to connect with the Uncle Sam shaft and on the 400 level of the Czar a crosscut is being driven to the 800 level of the Uncle Sam shaft. Ore reserves as of 1-1-1917 were estimated at 2,696,940 tons of copper ores and 76,922 tons of lead-silver ore with the lead reserves in the Gardner being depleted.

Development work in the Sac Hill porphyry included 2391 ft. of drifts, 1107 ft. of raises, 180 ft. of intermediate headings and 46,925 ft. of churn drilling. Fifteen million tons are now developed with 8.8 million tons of 1.67% ore in the East and 6.2 million tons of 2.5% porphyry in the West ore body which lies close to surface and can be mined by steam shovel methods. L. E. Foster from Chino Copper Company was employed to advise on open pit mining and his report estimated 16,530,000 tons of stripping to recover 5,161,000 tons of ore with a 3.2 stripping ratio, leaving 875,000 tons to be recovered by underground mining. Costs were estimated at 86 cents per ton of ore including the cost of equipment.

Total preliminary expenditures were estimated at \$6,283,900 including \$565,900 for equipment, \$38,000 for moving buildings, \$2,100,000 for a 3000 ton concentrator, \$540,000 for a power house and \$2,090,000 for preliminary stripping. Orders were placed for pit mining equipment.

The test mill treated 2221 tons of porphyry ores with a 75% recovery and shipped 399 tons of 5.56% concentrates to the Douglas Smelter. Test work was also conducted on lead ores with poor recoveries, 416 tons of 34.32% lead concentrates from 1427 tons milled being shipped to El Paso. Arrangements were made with Shattuck Denn, with reserves of 650,000 tons, to co-operate in experimental work on the treatment of lead ores and Roger Taylor formerly with A.S. & R. at their Selby



1916 (Cont)

plant was employed to report on the feasibility of a lead smelter at Douglas. He estimated that a 160 ton furnace would cost \$480,000 and that with Shattuck Denn ore, tonnages would justify two furnaces.

Some work was done on leaching of low grade carbonate ores with an 86% recovery on 3.0% ore. Precipitation in underground ditches and small tanks was arranged for in the Lowell, Sac and Gardner divisions before sending mine drainage to the C & A for pumping and 90,558 lbs. of copper was recovered by using scrap iron. The same arrangement in the Czar and Holbrook produced 28,942 lbs. of copper.

Concreting of the Sac shaft was completed in August and large storage pockets planned for the 1200 and 1400 levels. A fire at the White Tailed Deer destroyed the change room, headframe, burned part of the shaft timber and damaged the gasoline hoist. There were no active fires underground but drifts were driven on the Gardner 800 level over the fire zone for introduction of water.

Employees averaged 2053 at Bisbee with 1613 underground and 440 on surface. The hospital staff of 22 served Bisbee and Douglas with an average payroll of 1247. At the mine 44% of the employees were married and 73.2% were citizens. Miners pay averaged \$5.33 during 1916 increasing from \$4.60 in January to \$5.60 in June and back to \$5.00 in August. The average wage underground was \$5.39 and on surface \$4.39 per shift.

Sixteen employees were called into service by the Arizona National Guard during May and June and were allowed full pay during their absence. Union agitators failed to organize and win an election held in November. Costs under the Compensation Law for one fatality and 153 serious accidents were \$60,376.73 or 1.5% of the payroll and included expenses for two court cases. Under the Employees Benefit Association, \$44,107.18 was paid for sickness and accidents including 14 deaths among Bisbee employees. Monthly payments to pensioners who increased from 24 to 30 during the year averaged \$43.09 per individual with total payments of \$14,780.79

S. W. French, Manager of the Copper Queen, replaced Walter Douglas as General Manager of Phelps Dodge & Company and G. H. Dowell, Assistant Manager was made Manager of the Copper Queen Branch. Walter Douglas replaced James Douglas as President.

1917

Production from all sources totaled 800,585 tons containing 93,618,409 lbs. of copper and 6,870,128 lbs. of lead. The Company mined 737,729 tons of copper ore with a grade of 6.05% Cu., 0.764 oz. Ag and .0249 oz. Au. and lessees mined 35,986 tons of 4.07% copper ore. Ore from Sac Hill included 237 tons of 3.19% porphyry shipped to Douglas and 2124 tons sent to the experimental mill from which 265 tons of 7.20% copper concentrate were produced. Other products treated at the Douglas Smelter were 816 tons of 48.62% copper precipitates and 3267 tons of 2.33% copper slag from the old smelter dumps. Of 17,229 tons of 17.6% lead ores containing 11.66 oz. of silver, treated at El Paso, 14,658 tons was mined by the Company and 2571 by lessees. An additional 818 tons of lead ores were treated in the experimental concentrator and 120 tons of 42.09% lead concentrates shipped to El Paso. From surface, 2379 tons of 40% manganese was mined and shipped to Chicago. The Copper Queen shipped 778,300 tons to the Douglas smelter containing 93,169,905 lbs. of copper. Smelter production for 794,904 tons charged, produced 87,831,317 lbs. of copper, 550,156 oz. Ag. and 19,171 oz. Au.



1917 (Cont)

Mining costs averaged \$7.191 per ton and included stoping \$2.502, development \$1.109, tramming and hoisting \$0.973 and \$1.078 for taxes and general expense. Stopping efficiency decreased to 3.69 tons per man shift largely due to unsettled labor conditions following the strike called by I.W.W. on June 27. Advance in drifts averaged 1.17 ft. and in raises 0.82 ft. per man shift. Stopping by methods was 58.7% square set, 23.1% top slice and 18.2% cut and fill.

In the limestone divisions development totaled 57,484 ft., including 33,387 ft. of drifts, 13,509 ft. of raises, 10,567 ft. of intermediate drifts and raises, 10 ft. of winzes and 11 ft. of shafts. In addition to the above footages, 1034 ft. of headings were driven for ventilation, fire and leaching, 5868 ft. for stope preparation, 628 ft. in the lead areas and 30 ft. in the C & C shaft. Although no major discoveries were made a long narrow bed of oxidized ore on the contact of the limestone and Sac porphyry was followed by the Gardner 8-198 drift and new ore was cut by the Sacramento 13-130 heading. In the Junction, the 1636 drift developed sulphide ore near the sideline of the Hardscrable claim and in the Southwest an ore body cut by the 5-15 drift was estimated at 32,000 tons with a grade of 13% copper. A fine showing of carbonate ore was uncovered by the Tucker surface lease in the southwest corner of the New York claim and churn drill hole U-103 passed through 200 ft. of 5% ore between the 800 and 1000 ft. levels about 250 ft. to the northeast of the 13-13 ore body. The heading on the Czar 400 level will soon connect with the Uncle Sam shaft and the 1200 Lowell drift is approaching the Gardner shaft.

Reserves of copper ores as of 1-1-1918 were estimated at 2,500,472 tons and lead ores 89,339 tons. The Holbrook ores were seriously depleted and development at the White Tailed Deer increased reserves to 28,158 tons. With the shortage of miners following the strike less mining was done in the lead stopes. The contract with El Paso expired on December 19, 1917 and smelting thereafter was on an open rate estimated at an added cost of \$2.25 per ton. Profits from lead-silver ores were \$27.82 per ton. In the test mill, fair recoveries were made on lead ore from the Shattuck Denn but not on lead ores from the Southwest and Gardner.

In the Lowell division permanent bulkheads were erected to confine the fire area and fire doors were installed in all drifts leading to the Holbrook, Gardner, Lowell and Dallas shafts. Irrigation of the Holbrook and Czar stopes recovered 84,439 tons of copper as precipitates, 644,776 lbs. from the Lowell underground plant and 60,442 lbs. from the Sac Hill leach heap. The shipments of 816 tons of 48.62% copper precipitates contained 793,433 lbs. of copper.

Preliminary stripping at Sac Hill was started in January and the removal of 290,421 yds. for tracks and preparation of benches cost \$1.03 per cu. yd. Benches were planned at 60 ft. and the 5540 or upper bench with 124 ft. to the top of the ridge was estimated at 300,000 yds. Trackage to the 5540 bench required 2.25 miles of rail and a total length of 4.27 miles was laid during the year.

Plant construction included \$7,574.15 for the Dallas change room and \$2,650.26 for a set of boiler plate rolls. The warehouse and shops were moved to a site near the Lowell shaft and charged to pit preparation; and a new assay lab is under construction. Underground, a concrete lined ore pocket was constructed on the Sac shaft 1400 level with transfer raises up to the 1200 level. Under appropriation #85 for a new concentrator costing \$2,100,000, \$62,419.37 was spent, mostly on water development. Appropriation No. 86 was for pit equipment estimated at \$615,900 and \$605,637.75 was spent during the year.



1917 (Cont)

The labor force averaged 2264 with 1426 underground and 838 on surface. In January the miners wage rate was \$6.00 and \$5.35 in September when wages were stabilized based on a fixed selling price of 23.5 cents for copper. Wages during the year averaged \$5.72 underground and \$4.26 on surface. A strike called by I.W.W. on June 27 lasted 15 days. In September 100 employees were inducted into the armed forces and a special governmental commission visited the district to insure continuous production during the war. Under their orders a grievance committee of eight employees was established with one from each of the six divisions, one from the mechanical department and one from the Pit. Unsettled grievances were to be appealed to a labor administrator appointed by the commission.

The sale of Liberty Bonds was started and \$61,470.58 payroll deductions made. Employees with one or more years of service prior to January 1, 1917 were given a service bonus of \$100 for whites and \$60 for Mexicans and for 6 months or more \$50 and \$30 respectively; mainly to reward loyal employees during the I.W.W. strike. Under this plan \$112,360 was paid to 1282 employees on January 7, 1918. Compensation costs for 3 fatalities and 207 serious accidents cost \$57,014.71 or 1.45% of the payroll and \$49,761.85 was paid to employees from the Employees Benefit Association for normal deaths, sickness and accidents. Under the pension plan the number at Bisbee increased from 30 to 35 and payments of \$19,354.03 averaged \$47.44 a month per pensioner.

Taxes with an average rate of \$1.084 per hundred continued on a high valuation and amounted to \$625,466.27 for the mine and smelter based on a combined valuation of \$57,727,262.28 with \$52,686,587.38 assigned to the mine. The Tax Commission uses the earnings for the past 5 years capitalized at 15% or multiplies these earnings by six and two thirds.

Gerald Sherman continued as Superintendent of the Mining Department and A. T. Thompson was Assistant to the President; Stuart W. French terminated his services as General Manager. Dr. Shine joined the Medical Corp as Major but was stationed in Arizona and continued to devote part of his time to the Company hospital.

1918

Production from all sources totaled 770,524 tons containing 90,988,156 lbs. of copper and 1,234,497 lbs. of lead. Of this tonnage 760,723 tons containing 90,912,453 lbs. of copper were shipped to the Douglas Smelter where 789,827 tons from the Copper Queen were smelted and yielded 89,645,341 lbs. of copper, 484,706 oz. Ag and 16,545 oz Au. The Company mined 692,591 tons of copper ore with a grade of 6.14% Cu., 0.681 oz. Ag and .0225 oz. Au. Lessees mined 66,585 tons of 3.64% siliceous ore; 632 tons of 1.55% Neptune slag and mine sortings; 915 tons of 47.89% precipitates and 539 tons of 6.96% concentrates from 1272 tons of porphyry treated in the experimental concentrator, were also shipped to Douglas. Of 3471 tons of lead-silver ore shipped to El Paso, the Company mined 3363 tons and lessees 108 tons. Manganese ores shipped to Chicago totaled 5058 tons, prior to November 11 or Armistice Day when further receipts were cancelled by the Tennessee Coal & Iron Company.

Mining costs averaged \$8.064 per ton including stoping \$2.496, development \$1.508 haulage and hoisting \$0.992, bonus \$0.184, taxes and general expense \$1.260. Labor efficiency in stopes was 3.88 tons per man shift; drifts 1.19 ft. and 0.83 ft. per man shift in raises. Practically all development work was bonused. More leases were given to old time miners who could no longer work underground, who hired



1918 (Cont)

Mexicans and whose mining costs were \$5.75 per ton or less than Company costs. With lower lead prices and higher treatment charges, mining of lead-silver ores was materially reduced.

Development work during 1918 totaled 58,460 ft. including 39,885 ft. of drifts and 18,083 ft. of raises. The Gardner 10-106 drift driven easterly passed through 200 ft. of 5% ore and crosscuts developed a width of 175 ft. in ore. The 6-112 drift in this same division was in primary sulphides. Considerable more ore was found in the Southwest 5-15 ore area; 25 ft. of oxidized ore was cut by the Lowell 9-205 drift and more ore was developed in the Holbrook, where the reserves were considered as well depleted. In the Gardner, a heading was connected to the Lowell on the 1200 level; the Silver Bear and Uncle Sam shafts were retimbered and the C & C shaft was down to the 1500 level and enlarging from 2-1/2 to 3-1/2 compartments above the 1000 level was started. Sinking was suspended pending the arrival of a larger hoist and moving of the Spray head frame.

Stripping continued on Sac Hill with the removal of 1,099,660 yds. from the 5360, 5420, 5480 and 5540 benches. Direct costs averaged \$0.974 and total costs \$1.05 per cu. yds. Shovels averaged 40.4% of available operating time and 582 yds. per shovel shift. Until the latter part of the year, mechanics were scarce and shovels and locomotive equipment was not properly maintained. The new concentrator site was excavated and that for the power house underway. Plans were completed for the concentrator construction but erection postponed because of high costs and inability to obtain priority for structural steel. A portion of the orders for mill equipment were cancelled.

Expenditures under appropriations during 1918 were:

<u>No.</u>	<u>Description</u>	<u>Expended</u>
84	New Power House	\$ 60,318.80
85	New Concentrator	297,789.52
86	Steam Shovel Equipment	143,267.32
91	Sulphide Screening Plant	26,209.15
93	Addition to General Office	3,542.19
99	Loan to Warren Company	25,000.00
70	Added Story to Y.M.C.A.	8,414.37
82	Sac Hill Stripping	157,782.59
	Total	\$722,323.94

An arrangement was made with the C & A whereby the Copper Queen would loan \$50,000 to the Warren Company and Calumet and Arizona the sum of \$25,000 to develop third addition in Warren for their employees. One section for 150 lots was graded for streets, sewer and water lines installed and 33 houses financed at a cost of \$94,025, 22 residences for Copper Queen employees and 11 for C & A workmen. Other expenditures included \$9,721.22 for a sewer system in Upper Lowell to be repaid by a sewage disposal charge of \$5.00 per month per house; \$6,322.10 for portable houses for Mexicans; \$9,383.50 for a change room at the Holbrook and \$19,283.99 for one at the Czar.

The number of employees averaged 2343 with 1256 underground and 1087 on surface, with 327 entering the armed forces. Wages averaged \$5.91 underground, \$4.22 in the pit and \$4.71 on surface jobs. There were a number of wage changes and until April 16



1918 (Cont)

they were based on 26 cent copper regardless of the fixed price of 23.5 cents per pound. On July 1 when the Government's fixed price was raised to 26 cents the sliding wage scale was increased to 10 cents for each one cent change in the price of copper which made 75 cents per shift increases by August 1st. At years end the base rates for salaries had been increased by 42.5%. In December, 64% of the underground workers were married and 49% of all employees were so classified.

Service bonus continued, \$133,980 being given to 1096 Whites and 158 Mexicans. Pensions paid to 39 Bisbee Employees amounted to \$20,780.92 and averaged \$48.57 per month. With 80.3% membership in the Employees Benefit Association, \$34,235.31 was paid for sickness, accidents and deaths which totaled 35; seventeen of which were caused by influenza. State compensation payments totaled \$95,022.95 or 2.17% of the payroll for 14 fatalities, 11 of which occurred on Sac Hill and 276 serious injuries. Based on the need for the training of bosses, a course of lectures on practical mining and management was inaugurated. Valuations for tax purposes continued extremely high. With the mine valued at \$62,320,366 and with an average levy of \$1.059 per hundred, the mine and smelter taxes totaled \$725,063.05.

George Mieyr replaced Mr. Toohey as Pit Superintendent; Gerald Sherman resigned in November as Superintendent of Mines to become consulting engineer and was replaced by Arthur Notman. In February W. H. Webster was made Assistant Manager of the Copper Queen Branch with his office at Douglas; G. H. Dowell continued as Manager and A. T. Thompson continued as Assistant to Walter Douglas the President.

1919

Production from all sources totaled 604,706 tons containing 68,614,002 lbs. of copper and 9,372 lbs. of lead. Shipments to Douglas were 598,330 tons and the Smelter treated 515,461 tons of Copper Queen ores which yielded 56,726,353 lbs. of copper, 381,923 oz. Ag and .9491 oz. Au. In the limestone areas the Company mined 531,525 tons with a grade of 6.09% Cu., 0.840 oz. Ag and .0198 oz. Au. Lessees mined 55,366 tons of 2.66% copper ores. Other tonnage to Douglas included 7220 tons of 1.54% porphyry from Sac Hill; 17 tons of 6.72% ore from the Virginia claim; 612 tons of 33.97% precipitates; 1910 tons of 1.27% slag and flue dust and 1680 tons of 3.90% concentrates from 8027 tons milled in the experimental concentrator. Mining of lead ores was limited to 29 tons shipped to El Paso. Most of the lease ore was low grade lime fluxing to replace barren limestone at the smelter. The 7220 tons from Sac Hill was siliceous material used in the converters.

Mining costs averaged \$9.222 per ton including stoping \$2.494, development \$1.759, tramping and hoisting \$1.129, service bonus \$0.240, transportation \$0.344, taxes and general expense \$1.951. Under the arrangement for pumping, C & A was paid \$39,000 monthly. Costs for timber increased to \$32.46 per M bd. ft., F.O.B., Bisbee. Production was sharply curtailed during the first quarter because of a poor copper market, with no production from the White Tailed Deer. Direct costs for ore mined by lessees averaged \$4.30 per ton. The Night Hawk Leasing Company continued developing ore with most of the shipments from the 650 level. The work by Boras Leasing Company on the 400 level was discouraging.

Development headings totaled 48,907 ft., with 31,785 ft. of drifts and 16,617 ft. of raises. Efficiency per man shift averaged 4.25 tons for stoping, 1.41 ft. in drifts and 1.09 ft. per man shift in raises. In the Southwest division No. 1, additional ore was developed in the 500 level 5-15 ore area and by the 6-12 drift on the sixth level. Oxide and carbonate ore was found on the 1st and 3rd levels of the



1919 (Cont)

Czar No. 2 division and sulphides in the 263 crosscut on the 4th level. No new discoveries were made in the Holbrook No. 3 division; additional ore found on the 8th, 10th and 12th levels of the Gardner No. 5 division and sulphide ore of low to average grade from the 12th to the 14th levels of the Lowell or No. 6 division. In No. 7 division, the downward extension of the porphyry ore was developed and 2 to 5% sulphides opened up from the 11th to the 16th levels. Ore reserves decreased 104,977 tons but the grade was increased from 6.31 to 9.12% by the high grade oxidized ores in the Southwest division. Sinking of the C & C shaft was completed to 35 ft. below the 1800 level and the 800 level pump station completed and the 1800 level pump station started. Enlarging of the Dallas shaft continued with 587 ft. remaining, \$107,329 being expended for these two shaft jobs.

Stripping of 2,056,741 yds. from the 5315, 5360, 5420, 5480 and 5540 Sac Hill benches cost \$1,563,628.85 with direct charges of 70.2 cents and total cost of 76 cents per yard. Shovels averaged 818 yds. per shift with 49.5% loading time. Churn drills made 19.98 ft. per shift, explosives broke 1.73 yds. per pound used and the haul to dumps averaged 10,102 ft. To improve production and costs, a bonus system was started in August paying 50% of labor savings in excess of a base rate of 12.2 solid yards per man shift. An employees Ways and Means Committee was also organized to confer with foremen on operating problems. Work was resumed on the concentrator in September to complete the rock crushing plant for aggregate and finish the excavation for the concentrator and erect forms for concrete foundations.

Expenditures to appropriations during 1919 were:

<u>No.</u>	<u>Description</u>	<u>Expended</u>
85	New concentrator	\$611,480.31
86	Equipment for West Ore Body	394,296.17
91	Sulphide Screening Plant	31.11
101	Holbrook change room	1,134.98
103	Lowell change room	14,897.12
111	Remodelling Central Heating plant	1,277.04
115	Sac Change House	24,844.25
117	New Power House	236,171.62
	Sub total to Construction	\$1,284,132.60

Other charges under appropriation numbers included:

88	Jiggerville Sewers	9,743.87
99-107	Warren Houses in 3rd Addition	75,000.00
118	Educational work at Bisbee	1,453.92
82	Stripping West Ore Body	1,563,628.85
83	Clearing ground for West ore Body	22,999.30
	Grand Total (\$2,960,958.54)	\$2,956,958.54

Contracts were let for 31 houses in the Warren 3rd addition at a cost of \$103,538.35. In addition to the power house construction at Bisbee, two steam turbines were installed at the smelter with a transmission line to Bisbee; \$516,217.68 being spent during 1919.

Employees averaged 2276 with 957 underground and 1319 on surface including the concentrator construction workers. Ex-soldiers with previous service were rehired and totaled 329. Hires also included 293 service men with no previous employment



1919 (Cont)

with the Company. The underground force decreased to 885 in December. Wages averaged \$5.24 per shift; \$6.01 underground and \$4.65 for surface employees. In the open pit the rate for white employees was \$5.62 and \$3.40 for Mexicans. In January wages were based on 26 cent copper. In February and March reductions of 50 cents per shift were made. On July 16 with an arbitrary figure of 24 cent copper, wages were increased 75 cents, with an additional 25 cents for mechanics. The differential between miners and muckers was changed from 25¢ to 50¢ per shift. The educational course for bosses was completed in October with a course of 43 lectures and average attendance of 167.

Under the service bonus plan, \$162,365 was paid to 1483 employees at Bisbee. Pensioners totaled 48 in December with \$27,486.41 paid during the year. Compensation payments were \$58,768.64 with 208 serious injuries and no fatalities. Of several court cases, the Company paid \$10,000 for the loss of a leg under an adverse decision. The Employees Benefit Association paid \$42,493.02 for accident and sickness benefits at the mine and smelter. Valuations continued high with \$64,500,926.71 for the mine and with an average levy of \$1.305, taxes for the mine and reduction works amounted to \$916,916.76.

R. R. Boyd, former Superintendent of Arizona Commercial was employed in December as Assistant Mine Superintendent, G. H. Dowell continued as Manager and P. G. Beckett was made General Manager at years end.

1920

Production of all classes of ore mined or recovered totaled 832,172 tons containing 71,443,396 lbs. of copper and 243,836 lbs. of lead, the production figures including 233,914 tons of .906% pit materials placed on dumps and which contained 4,240,286 lbs. of copper. The Company mined 480,569 tons from the limestone division with a grade of 6.14% Cu., 0.871 oz. Ag., .0158 oz. Au and lessees mined 88,738 tons of 3.75% siliceous ores. Precipitates totaled 507 tons with a grade of 32.27% copper. From Sac Hill, 27,363 tons of 2.096% porphyry ore was shipped to the Copper Queen and C & A smelters and 233,914 tons placed on leach dumps. Of the total production, 519,385 tons were shipped to the Copper Queen smelter and 77,792 to the C & A smelter. Lessees mined 827 tons of 14.72% lead ore with 7.38 oz. Ag, shipped to El Paso and 254 tons of manganese ore mined by lessees and shipped to steel mills.

Mining costs averaged \$10.374 per ton including stoping \$2.427, development \$2.136, haulage and hoisting \$1.142, transportation \$0.303, service bonus \$0.302, taxes and general expense \$2.407. Efficiencies averaged 4.78 tons per man shift in stopes, 1.22 underground, 1.29 ft. in drifts and 1.30 ft. per man shift in raises. Lessee's costs were \$6.32 per ton delivered to Douglas with increased tonnage from the Boris and Night Hawk leases.

Development footage totaled 44,037 ft. Ore reserves decreased 158,096 tons with losses in the Southwest and Czar divisions. New ore was developed in the Bodie area of the Holbrook division, sulphide ore between the Lowell 1300 and 1400 levels and new developments on the Sac 1700 and 1800 levels. The 254 tons of manganese returned a net profit of \$24.82 per ton.

Stripping of 2,500,889 cu. yds. was on the 5315, 5360, 5420 and 5480 benches, the latter being a completed bench. Of these yardages, 1,952,226 was from the West Ore Body and 548,663 yds. from the East Ore Body. Costs averaged 77.6 cents per yd; shovels 767 yds. per shift with 41.09% loading time; churn drills 24.32 ft. and 1.99



1920 (Cont)

yds. broken per lb. of explosives used. Except for 27,363 tons shipped to Douglas and 233,914 tons placed on the leach dumps, all stripping was disposed of to the Warren dump with a haul of 11,901 ft. The economy bonus ranged from 1.62 to 17.2% with \$57,300 being paid during the year. On February 1 the standard was reduced from 12.2 yds. per man shift to 11.0 yds. and back to 12.0 on March 1, 1920. In November shovel shifts per day were reduced from 11 to 5.

During 1920, the following expenditures were made:

<u>Appropriation</u>	<u>Description</u>	<u>Expended</u>
85	New Concentrator	\$1,919,918.24
86	Steam Shovel Equipment	523,068.21
115	Sac change room	9,266.92
117	New Diesel Plant	106,840.20
140	Sprinkler System in Supply Dept.	3,580.96
141	Concreting Dallas shaft	159,248.74
143	Don Luis precipitation plant	87,326.22
148	Labor Department Office	7,253.14
	Total to Plant Costs	\$2,816,502.63
118-147	Education Department (Operation)	6,952.29
82	Sac Hill Stripping	\$1,448,285.63
83	Sac Hill Preparatory Expense	7,196.67
88	Jiggerville Sewage System	594.57
139	Sac Hill E.O.B. Stripping	493,118.58
142	First Unit of Leaching heap	93,383.33
	Sub total - Deferred Accounts	2,042,578.78
	Grand Total	\$4,866,033.70

A total of \$202,419 was spent on the Dallas and C & C shafts and \$6,400 for mine cars.

Employees averaged 2663 with 884 underground and 1779 on surface. Wages averaged \$5.70 per shift; \$5.97 for underground employees and \$5.16 for surface men. In the pit white employees were paid \$5.68 and Mexicans \$3.67 with an average of \$4.44 per shift. Wage rates with a base of from \$1.60 to \$3.15 carried an increment of \$1.65 per shift and the increment for rates in excess of \$3.20 was \$1.85. On December 10 a notice was posted reducing these increments to \$0.85 effective 1-1-1921 and the discontinuance of the service bonus within one year. At years end 65.8% of underground employees were married men and 80.5% citizens. Of the entire payroll 61.6% were citizens.

Under the Annual Service Bonus Plan \$202,749.52 was paid to 1743 employees at Bisbee. The average age of 70 pensioners was 61 years with 19.3 years of service. Pension payments were \$48,392.13 or \$635.62 per year per pensioner. Accidents included 9 fatalities, 5 of which were in the Pit, 225 serious and 1446 minor injuries. Compensation totaled \$104,635.37 or 2.33% of the payroll costs and including \$10,603.97 for operating the Adjustment Bureau. The Employees Benefit Association paid \$45,980.99 for sickness and accidents.

The State Tax Commission continued capitalizing the average earnings during the past 5 years at 15% for valuing mines. The mine was valued at \$66,567,274.66 and



1920 (Cont)

with an average tax levy of \$1.376, taxes at Bisbee and Douglas totaled \$998,020.82. Of this amount \$872,435 charged to the limestone divisions was equivalent to \$1.82 per ton.

H. C. Henrie, former Chief Clerk was made Manager of the Labor Department. There were no major changes in supervisory personnel.

1921

The Copper Queen Branch production from all sources totaled 515,632 tons containing 30,610,173 lbs. of copper and 4,916,418 lbs. of lead. Of this tonnage 159,482 tons containing 19,073,108 lbs. of copper was from underground operations and included 136,174 tons of limestone ores with a grade of 6.67% Cu., 1.381 oz. Ag, .0152 oz. Au. of which 18,279 tons was shipped to the C & A smelter; 4359 tons of 3.01% ore disposed of to the smelter dump and 1403 tons of 5.84% ore to the concentrator dump. Lessees mined 1305 tons of 3.27% siliceous ores, which with 434 tons of 38.72% copper precipitates were sent to the Copper Queen smelter. Of 15,807 tons of 15.55% lead ore containing 13.55 oz. of silver and shipped to El Paso 4234 tons were mined by lessees and 11,573 tons by the Company. The Douglas Reduction Works treated 61,015 tons from the Copper Queen Branch, producing 14,920,779 lbs. of copper; 132,467 oz. Ag and .2248 oz. Au.

Pit operations were credited with 356,150 tons containing 11,537,065 lbs. of copper. Of this tonnage 12,046 tons of 3.74% flux was shipped to the Copper Queen smelter; 1372 tons of 2.10% material to the C & A smelter; 15,928 tons with a grade of 5.60% stocked on the smelter dump; 181,363 tons of 1.69% placed on the concentrator storage pile and 145,441 tons of 0.92% leach material containing 2,667,298 lbs. of copper was disposed of on the leach dumps.

Curtailement of operations began in April and after April 12 underground operations were limited to development work. In Sac Pit stripping operations were suspended on October 31. During the first quarter of 1921 mining costs averaged \$9.351 including stoping \$2.264, development \$1.747 and \$2.968 for taxes and general expense. Mining of 15,807 tons of lead ore, including 4234 tons by lessees resulted in a net profit of \$5.92 per ton.

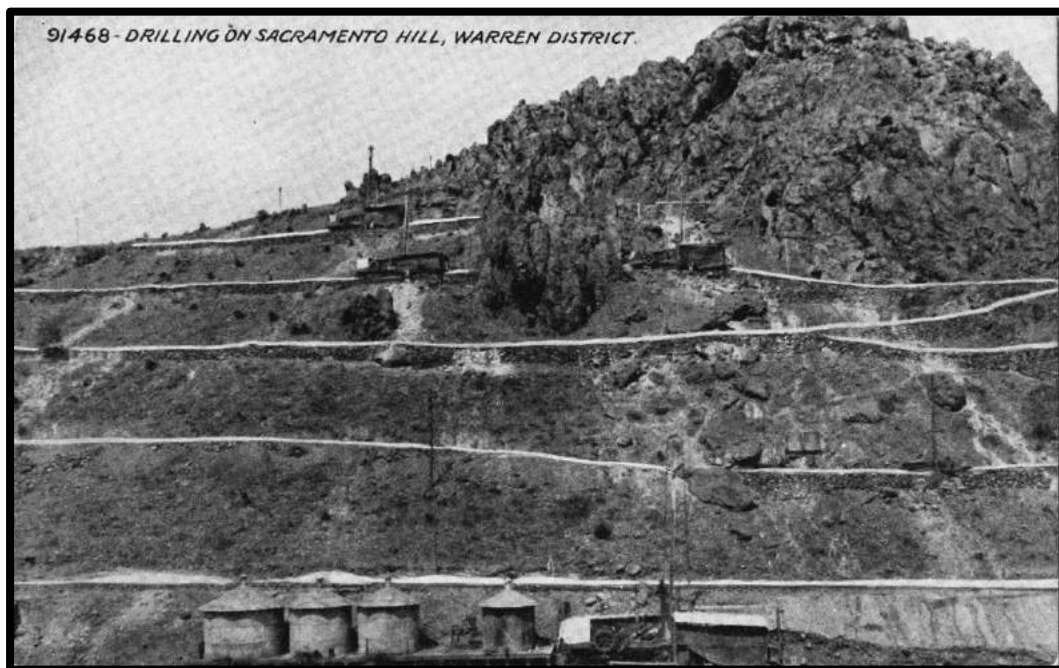
Development work totaled 57,093 ft. The Cuprite shaft was retimbered to the 300 level and sunk to the 600 level with connecting drifts from the Holbrook on the 400 and 600 levels, to explore the Wood Chopper and adjacent claims. To expedite development of the Sacramento division on the 1700 and 1800 levels, 13,800 ft. of development headings were driven and further development of the Southeast Extension was on the upper levels. The White Tailed Deer shaft was sunk 200 ft. to the 500 level and 1200 ft. of drifts run on the 2nd, 4th and 5th levels with discouraging results on the Tuscarora claim. Under contract with the Boras Leasing Company, the Boras shaft was enlarged to 2-1/2 compartments from the 7th level to surface and sunk to the 11th level to develop the Boras and Tuscarora claims below the 9th level. Development in the Uncle Sam, Southwest, Czar and Holbrook divisions included 24,300 ft. of headings. Ore reserves in the Uncle Sam, Southwest, Czar, Holbrook, Gardner, Lowell, Sacramento and White Tailed Deer were estimated at 2,476,385 tons at 7.41% copper; with but 19,265 tons in the White Tailed Deer and the major portion of 920,406 tons in the Sacramento.

During the ten months of operation, 702,009 yds. of stripping included 685,854 yds. from the West Ore Body and 16,155 from the East ore Body. Churn drills averaged 31.32 ft. per shift, shovels 1041 yds. with 48.95% loading time, explosives 2.10 yds. per pound used and disposal haul to dumps was 13,721 ft. Direct costs were \$0.545 per yd. and total costs \$0.681 including service bonus of \$.029, taxes and general





The Queen Tunnel/adit in 1963(see p. 24, para. 3 & p.30, para. 3)



Churn drilling near the peak of Sacramento Hill. (see p. 3,0 para. 4)





The mouth of Brewery Gulch during the Bisbee Deportation (see p. 32, para. 1 & p.33, para. 1)



Concrete and steel fire doors near a shaft. The two mine cars blocking the doors were a safety concern. The doors would be blocked from shutting. (see p.32, para. 4)



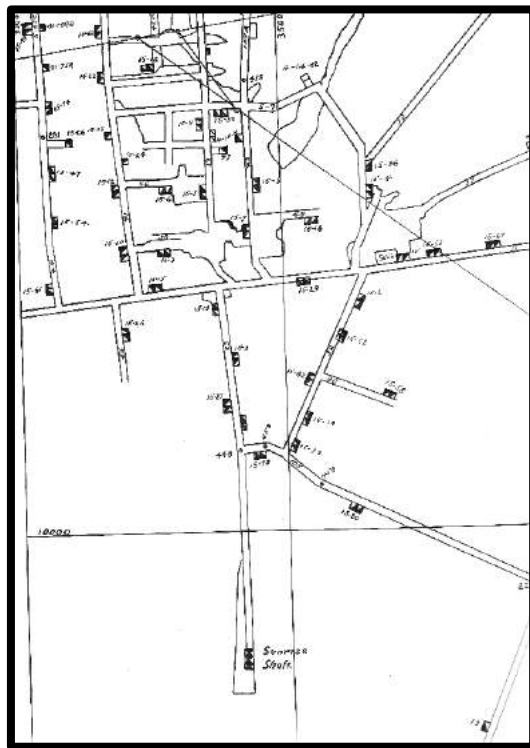


The new change house for the Czar Mine (see p.34, para. 5)

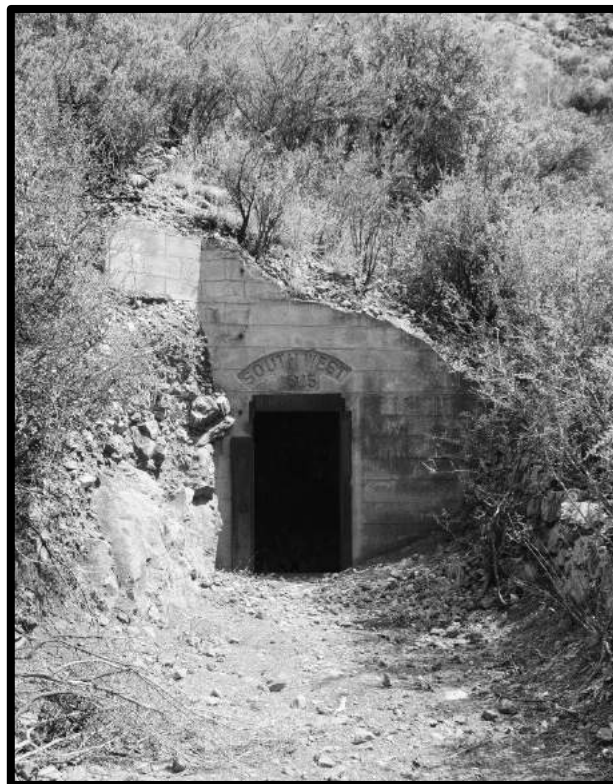


Interior of the Czar change house (see p.34, para 5)





Part of the 5-15 mining area on the 5th level of the Southwest Mine (see p.35, para. 6)



5th level Southwest Mine portal (see p.35, para. 6)



1920 (Cont)

expense. On February 1 shovels were reduced from 5 to 2 per day and employees from 395 to 170. On October 31 stripping was considered as being completed having mined 6,650,070 cu. yds. at an average unit cost of \$0.818. On March 1 the bonus standard was increased from 11 to 12 yds. per man shift and during 1921 mining was on the 5270,5315 and 5420 benches. Reserves were estimated at 2,331,001 tons of 5.13% smelting ore, 20,646,200 tons of 1.52% milling ore and 8,961,064 tons of 0.74% leach.

Expenditures during 1921 were:

<u>Appropriation</u>	<u>Description</u>	<u>Expended</u>
85	New Concentrator	\$1,198,873.29
117	Diesel Power Plant	496,867.90
141	Concreting Dallas Shaft	60,348.25
144	Haulage Equipment-Ore to Mill	1,476.14
149	Gamewell Fire Alarm System	7,351.37
150	Surface Transmission Lines	73,350.40
151	Joint Transmission Line	6,750.60
152	Sunrise Shaft Traction Hoist	1,337.35
	Total to Plant Costs	\$1,846,355.30
82	Sac Hill W.O.B.-Removing Waste	407,430.98
139	Sac Hill E.O.B.-Removing Waste	18,385.53
86	Pit Equipment	7,940.41
142	1st Unit of Heap Leach	16,005.51
143	1st Unit of Precipitation Plant	14,619.06
	Total to deferred accounts	464,381.49
147	Education Department to Operation	3,454.56
	Grand Total	\$2,314,191.35

During the first quarter of 1921, \$46,849.26 spent on the Dallas and Sunrise shafts was charged to operating accounts; concreting of the Dallas shaft to the 1800 level, the 1400 level pocket was finished and concreting of the 1600 level pocket was two thirds complete. The diesel plant was put into operation on December 15.

Employees during 1921 averaged 1364 with 457 underground and 907 on surface and construction. The mine with 680 day's pay, 36 bosses and foremen and 2 underground superintendents was reduced to 340 - 16 - 0 respectively by May 1. The surface departments were likewise reduced from 190 to 138 but later increased to 175 with construction of the Diesel Plant. On January 1, wages were reduced \$1.00 for employees with a wage rate of \$5.35 or over and 80¢ for those receiving less than \$5.35. The increment for salaried employees was reduced from 37.5 to 17.5%. On May 1st there was a further reduction ranging from 25 to 60 cents and a 5% cut in salaries. In the reduction of labor forces it was necessary to lay off 180 married men.

Accidents included 5 fatalities, 122 serious and 720 minor with compensation costing \$95,117.34 or 4.48% of the payroll. The annual service bonus of \$93,490 was paid to 850 employees and \$26,225.32 was paid for sickness and accidents by the Employees Benefit Association. Pensioners at Bisbee totaled 81 who were paid \$51,125.86. An Employees Representation Plan was adopted by a 80.3% vote at a special election on June 28. For tax purposes the mine was valued at \$53,567,439.41 and mine, smelter and plant at \$59,958,225 with an average levy of \$1.536 taxes amounted to \$921,031.29.



1921 (Cont)

R. R. Boyd resigned as Assistant Superintendent of the Mining Department on December 31 and was not replaced. The services of the two underground superintendents were dispensed with; Frank Sinclair having been employed 21 years and J. W. Toland a lesser number of years. They were given an indefinite leave on one-half pay.

1922

Production from the Copper Queen Branch totaled 389,367 tons with gross contents, of 47,962,123 lbs. of copper, 8,560,525 lbs. of lead and 247,793 lbs. of zinc. The Company mined 269,520 tons of copper ores with a grade of 7.26% Cu., 1.933 oz. Ag. and .0245 oz. Au., 16,530 tons of which were shipped to the C & A smelter. Shipments to Douglas also included 53,710 tons of 4.14% ore mined by lessees and 347 tons of 37.82% precipitates. Of 36,293 tons of lead ore shipped to El Paso, the Company mined 26,156 tons and lessees 10,137 tons in addition to 457 tons of lead-zinc ore shipped to the United States Zinc Company and to Ozark Smelting & Mining Co. Shipments of stockpile material, previously taken into production records, were 26,903 tons with a grade of 4.35% Cu. Of the total 335,960 tons of copper bearing materials produced, 335,960 tons was sent to the Copper Queen Smelter and 16,657 tons to the C & A smelter. The Douglas Reduction Works smelted 416,649 tons of Copper Queen ores and recovered 51,905,150 lbs. of copper, 625,871 oz. Ag. and 9652 oz. Au.

Underground mining was resumed in March. Costs per ton for the 10 months in 1922 averaged \$8.827 including stoping \$2.185, development \$1.003, haulage and hoisting \$0.841, and \$3.335 for taxes and general expense. Part of the work at the C & C shaft costing \$28,597.53 and \$54,938.20 for contract work at the Boras was charged to operating costs. The 53,710 tons of copper ores mined by lessees netted a \$1.92 profit per ton to the Company. The 36,293 tons of lead ore shipped to El Paso was at a profit of \$7.62 per ton.

In addition to the 21,040 ft. of development in the Uncle Sam, Southwest, Czar, Holbrook, Gardner, Lowell and Sac division, 2033 ft. were driven in the Southwest lead areas and 2324 ft. in the C & C for water development. At the Boras \$54,938 was spent under contract for 180 ft. of shaft sinking, 40 ft. of station work and 2756 ft. of drifting. Ore reserves were estimated at 2,101,468 tons with a grade of 6.46% in 8 divisions with the greatest amounts in the Southwest and Sac and only 19,625 in the White Tailed Deer division.

Operations at Sac Hill were essentially closed down during the entire year with expenditures of \$28,542.99 for maintenance, insurance and taxes. Production included 28,913 tons of 6.54% ore shipped to the Copper Queen smelter and 127 tons to the C & A smelter.

Expenditures during 1922 were:

<u>Appropriation</u>	<u>Description</u>	<u>Expended</u>
82	West Ore Body Stripping	\$ 28,542.99
139	East Ore Body Stripping	2,469.55
85	New Concentrator	140,955.38
86	Pit Equipment	1,204.14
117	Diesel Plant & Engines	14,356.76
141	Concreting Dallas Shaft	1,434.80
143	First Unit Precipitation Plant	52.17
152	Traction Hoist - Sunrise Shaft	40,151.81
	Total	\$ 226,759.32
	Construction	196,950.92
	Deferred Accounts	29,808.40



1922 (Cont)

Employees averaged 982 with 526 underground, 148 in the mechanical department and 149 salaried employees. Hires totaled 1267 and terminations 1154. The underground payroll increased from 443 to 645 and total employees from 1017 to 1130. Wages were increased 10% on October 1 but many employees left for higher paying jobs in California. The Employees Representation Committee proposed a pension plan and inaugurated a code of safety rules.

With 3 fatalities, 81 serious and 437 minor accidents, compensation cost \$56,883.40 or 4.04% of the payroll. The Employees Benefit Association paid \$25,333.80 for sickness and accidents. Pensioners at Bisbee totaled 94 with 18 pensions granted during the year with pension payments totaling \$57,381.90. For tax purposes the mine was valued at \$48,617,830.68 and \$55,552,063 for the mine and smelter with a levy of \$1.286, taxes totaled \$715,033.58.

W. H. Webster, Assistant Manager, left in April and D. D. Irwin was appointed General Superintendent. A. W. Hudson terminated his services on August 15 and on December 31 F. H. Haynes succeeded Arthur Notman as Mine Superintendent. W. J. Spalding replaced O. N. Alvin as Master Mechanic in October.

1923

Production from all sources totaled 1,189,570 tons containing 87,935,334 lbs. of Cu., 6,307,412 lbs. of lead and 610,709 lbs. of zinc. The underground mine tonnage of 532,842 tons included 371,541 tons of copper ores with a grade of 6.637% Cu., 0.926 oz. Ag. and .0193 oz. Au., of which 22,630 tons was shipped to the C & A smelter; 125,958 tons of 4.90% copper ore mined by lessees, 644 tons of silver ore and 154 tons of 43.20% precipitates. Of 33,232 tons of lead ores shipped to El Paso, 16,038 tons was mined by lessees who also shipped 1313 tons of lead-zinc ore to the Ozark S. & M. Company.

Production from Sac Hill totaled 656,728 tons containing 25,162,955 lbs. of copper and included 596,384 tons of 1.85% mill ore, 39,519 tons of 1.57% mill ore stockpiled; 10,355 tons of 4.18% smelting ore shipped to Douglas, 10,670 tons of 4.63% smelting ore placed in ore bins at Bisbee and 800 tons of 2.61% low grade shipped to the C & A smelter.

The Douglas Reduction works smelted 648,899 tons from the Copper Queen Branch which yielded 76,247,595 lbs. of Cu., 580,975 oz. Ag. and 16,292 oz. Au. Mining costs averaged \$8.246 per ton or 6.211¢ per lb. for 371,541 tons of 6.64% ores mined. Costs included deferred charges of \$64,716.48 for C & C shaft development and concreting the Dallas shaft; \$12,885.78 for obsolete supplies and \$20,876.50 for moving and installing the Czar hoist at the Sac 1600 level winze.

More extensive exploration of the limestone areas was started and the contract renewed with the Boras Leasing Company for two drifts in the Tuscarora claim. Development totaled 36,226 ft. with 11,618 ft. in the lower division of the Sac and Gardner; 9754 ft. in the upper levels of the Southwest and Higgins; 2649 ft. in the S.E. Extension; 2103 ft. at the Boras and 436 ft. in the White Tailed Deer. In addition to the above footages; 535 ft. of headings were driven for lead ore development and 9666 ft. for stope preparation. New ore was found in the Sac 14-10 and 1722 drifts, in the Gardner 14-44, Lowell 13-30, Uncle Sam, Higgins and S.E. Extension. Ore reserves as of 1-1-24 were estimated at 1,737,183 tons of 5.9% ore in the seven limestone divisions and 1,142,287 tons of 5.1% ore in the S.E. Extension.

Early in 1923 completion of the mill was decided on and the labor force built up to have the pit in production by October. Mining of 1,481,671 cu. yds. including



1923 (Cont)

282,527 yds. of ore was at a unit cost of .916 cents per yd. or \$1.772 per ton of ore, including \$.364 for taxes. Tonnage per shovel shift averaged 786 cu. yds. Production included 656,728 tons of 1.91% ore, 434,239 tons of 0.93% leach and 1,199,144 yds. of waste. Reserves indicated 7,658,460 tons with a grade of 2.03% inside the pit limits and 683,792 tons at 1.48% outside of the limits. The first leach heap was completed and ready for irrigation and by year's end, leach materials totaled 807,950 tons with a grade of 0.95% Cu. During the year expenditures for heap preparation were \$28,069.96 or \$138,641.61 to date, including the cost of rail trackage.

One section of the mill was started April 2, 1923 and by October 3 units were treating 4000 tons daily. During the year 615,177 tons of 1.83% porphyry were milled with an 89.19% recovery, 4.79 ratio in producing 128,578 tons of 7.82% concentrates. Costs of \$0.987 per ton was equivalent to 3.224¢ per lb. of copper. Construction was completed and totaled \$4,303,748.92

Charges to appropriations during 1923 included:

<u>Appropriation</u>	<u>Description</u>	<u>Expended</u>
82	West Ore Body - Waste Removal	\$ 37,841.78
139	East Ore Body - Waste Removal	443.69
85	New concentrator	72,312.81
86	Pit Equipment	73,932.83
143	First Unit of precipitation plant	50.91
144	Railroad Haulage Equipment	11,897.98
156	Leach heap	29,252.77
158	Moving Czar Hoist to Sac Winze	20,876.50
	Total	\$ 246,507.45
	To Operation	20,876.50
	Deferred Accounts	141,471.07
	Construction	84,159.88

In starting the pit and concentrator, the number of employees increased from 1130 to 2169 with 4031 hires and an average of 1715 working. Increases included 155 underground, 566 in the pit, 189 at the concentrator and 89 for the mechanical department. The wage scale averaged \$5.74 with a 10% increase on March 16 and a similar decrease on November 1, 1923. The Employees Congress held regular monthly meetings and drew up a code of rules for employment and discharges. Of six grievances two on discharges were appealed to the Supreme Court with one adverse decision.

Compensation costs of \$106,486.19 or 3.71% of the net payroll was for 5 fatalities, 182 serious and 1060 minor accidents. Under the Employees Benefit Association, \$36,341.58 was paid for sickness, accidents and deaths. A new plan for pensions was placed in effect September 15 whereby employees were entitled to a pension in leaving the Company after 22 years of service, regardless of age or physical condition. Three pensions were granted, making a total of 94 at Bisbee in December with payments totaling \$57,958.00. The valuation of the mine for tax purposes was \$39,239,798.68 or \$46,603,017.53 for the mine, mill and smelter plants. With a levy of \$1,590; State and County taxes amounted to \$741,158.97 at Bisbee and Douglas.

In December George Mieyer, Pit Superintendent, left the employ of the Company and was replaced by S. G. Plummer of Coleraine, Minn. Ernest Wittenau, formerly at Morenci, was placed in charge of the concentrator which began operating in April.



1924 (Cont)

Operating Accounts	\$ 3,328.56
Deferred Accounts	126,165.82
Plant Construction	64,832.49

Total employment remained constant or 2169 in January and 2182 in December with an average of 1983 working. There were 2780 hires and 2767 terminations. The Employees Congress held monthly meetings and established an apprenticeship plan for the mechanical department. Of five formal grievance hearings two were appealed to the Supreme Court committee. In December 98 pensioners averaged 63 years of age and payments of \$62,384.87 during 1924 averaged \$649.84 to each individual.

Compensation costs totaled \$151,759.87 or 4.85% of the net payroll including \$7,908.31 for operating the Adjustment Bureau. During the year there were 6 fatalities, 187 serious accidents and 1803 minor injuries. The Company continued contributing \$15,000 annually to the Employees Benefit Association which paid out \$49,794.03 in accident and sickness benefits. For tax purposes the mine was valued at \$31,612,596.09 and the mine, mill and smelter at \$38,243,284.78 with a combined \$1.414 tax rate, State and County taxes were \$540,820.46.

The administrative personnel consisted of:

P. G. Beckett	General Manager
G. H. Dowell	Manager
D. D. Irwin	General Superintendent
F. E. Hayes	Mine Superintendent
S. G. Plummer	Supt. of Sac Hill
E. Witteneau	Concentrator Superintendent
A. W. Hudson	Supt. of Leach and Precipitation

1925

Total production of 1,940,738 tons contained 116,379,978 lbs. of copper; 7,103,853 lbs. of lead and 81,923 lbs. of manganese. The Douglas Reduction Works smelted 817,031 tons from the Copper Queen Branch with recoverable metals of 100,983,696 lbs. of copper, 621,577 oz. Ag. and 29,917 oz. Au.

Production from the limestone areas totaled 521,326 tons of which the Company mined 419,257 tons with a grade of 6.50% Cu., 0.805 Ag., .0187 Au; 101,435 tons of 4.52% copper ore by lessees and 634 tons of 15.81 oz. Ag. ore. From the southeast Extension, 44,244 tons of 1.94% porphyry was sent to the mill and 7995 tons of 2.31% ore sent to the smelter. Manganese ore shipped to Besemer, Alabama yielded 81,923 lbs. from 94 tons and of 34,396 tons of 10.38% lead ore shipped to El Paso, lessees mined 21,796 tons. Underground production totaled 608,055 tons with no precipitates.

From Sac Pit, with a total of 1,331,936 tons, 1,232,792 tons of 1.586% porphyry was delivered to the concentrator; 76,148 tons of 6.25% direct smelting ore stored in the smelter ore bin; 22,373 tons of 1.59% porphyry placed in the mill stock pile and 623 tons of 8.85% lease ore was shipped to Douglas. From the Don Luis precipitation plant, 746 tons of 68.62% precipitates were shipped to the Douglas Smelter.

Underground mining costs in the limestone areas averaged \$7.993 including \$2.407 for stoping, development \$1.053, tramping and hoisting \$1.129, taxes and general expense \$1.759. Stopping efficiency was 5.77 tons per man shift. In the porphyry, mining costs averaged \$4.734 per ton. Per pound costs including smelting for the Copper Queen Branch averaged 11.28¢; 10.53¢ for the limestone ore; 23.71¢ for underground porphyry and 12.50¢ for Sac Hill based on 101,020,692 lbs. of copper produced.



1925 (Cont)

Underground production came from the Sacramento, Lowell, Gardner, Southwest, Uncle Sam, Czar, Holbrook and White Tailed Deer. Mining costs included deferred charges of \$49,077 for C & C development, \$50,310 for concreting the Dallas shaft and \$17,558 for obsolete materials. Lead ores shipped to El Paso netted a profit of \$3.30 per ton on lease ore and \$6.57 on the 12,600 tons mined by the Company. Beginning in April caving by the Morenci timbered slide method was started above the 600 level in the small top portion of the S.E. Extension of the East Ore Body. Of the 52,239 tons of 2.0% porphyry mined, about 18,000 tons came from the caving block. Water caused considerable difficulty in handling the material in the mine and through the mill.

Development in the limestone areas totaled 42,552 ft. including 30,211 ft. of drifts, 12,071 ft. of raises and 170 ft. of Gardner shaft sinking of this footage 12,724 ft. was stope preparation. In the S.E. Extension 7372 ft. of development included 3972 ft. of drifts, 2622 ft. of raises and 778 ft. of inclines. At the C & C 1421 ft. of drifting was for water development and 201 ft. of raises driven to check Sac churn drill holes. Development by lessees at the Night Hawk, White Tailed Deer and two other leases included 2395 ft. of drifting, 581 ft. of raising and 50 ft. of shaft work. The comprehensive geological investigation was under the direction of Dr. Augustus Locke. Tonnage developed was limited to 268,000 tons and 418,000 tons were mined from the reserve areas which were estimated at 1,602,081 tons of 5.35% limestone ores and 2,905,429 tons in the S.E. Extension of the East Ore Body. No ore was developed above the Sacramento 1500 level in the south end of the Morning Star claim but developments at the Boras, Night Hawk and White Tailed Deer were encouraging

Production of ore from Sac Hill was limited by the tonnage of concentrates that could be handled through the smelter roasters and reverbs. Mining of 1,475,503 yds., 866,729 yds. of stripping and 608,744 yds. of ore, was at a cost of \$0.621 direct charges and \$0.718 total costs per yd. The benches above the 5210 were completed and the 5180 established. Shovels averaged 1000 yds. per shift, churn drills 39.35 ft. and burley drills 36.77 ft. The stripping ratio during 1925 was 1.43. The Diesel plant operated all year with a cost of 0.83¢ per KW Hr.

The Don Luis precipitation plant shipped 746 tons of 68.62% copper precipitates from the Pit leach dumps containing 1,023,846 lbs. of copper. The plant was credited with 912 tons with 226,612 lbs. from underground leaching and Czar water or a total of 1,224,211 lbs. of salable copper. Water losses averaged 23% and cleanup launders were added to recover precipitate from the plant tanks.

The concentrator milled 1,300,248 tons of 1.59% porphyry with a recovery of 87.97%, a ratio of 5.95 and produced 218,468 tons of 8.34% concentrates. Direct costs were 65.4¢ and total costs 75.2¢ per ton. Considerable experimental work was done to raise the grade of concentrates by finer grinding and use of Xanthates. The primary flotation tables were discontinued and all flotation used.

Unusual expenditures are tabulated below:

<u>Appropriation</u>	<u>Description</u>	<u>Expended</u>
86	Steam Shovel Equipment	\$ 1,819.67
139	Stripping East Ore Body	630.46
143	First Unit of Precipitation Plant	447.93
156	Leach Heap No. 1	20,977.48
160	Development East Ore Body Sac Hill	3,251.50



1925 (Cont)

<u>Appropriation</u>	<u>Description</u>	<u>Expended</u>
161	Trackage and Leach Heap No. 2	\$ 27,192.26
165	Economizers for Central Power Plant	9,732.54
166	Pump Installation to elevate tailings	6,430.80
168	Connecting No. 6 Sac Conveyor Tract	6,175.02
170	Rotary conveyor from Nacozari	4,301.57
172	Lathe for machine shop	6,132.00
175	Signal System for Gardner Shaft	4,474.71
176	Porphyry mining - deferred	150,000.00
178	Supply Dept. Stock record System	3,863.96
	Total - Distributed to:	\$ 245,449.90
	Operating Accounts	174,502.01
	Deferred Operating Accounts	53,891.37
	Construction	17,056.52

At the smelter appropriation No. 173 for \$1,500,000 was approved to build two new reverbs with six 11-hearth superimposed roasters, individual Cottrel units for the roasters and a new smelter stack.

The number of employees averaged 1728 with 1908 hires and a slight reduction with a lower stripping ratio in the pit and less work at the tailing ponds. There was no change in the wage scale and underground employees averaged \$5.79 per shift. The Employees Congress, in operation for 4-1/2 years, met monthly and made 28 recommendations to management, 22 of which were put into effect. The Grievance Committee held five hearings, two of which were appealed to the Supreme Court Committee. Seven pensions were granted making a total of 101 pensioners with an average age of 64.1 years and 19.5 years of service. Pension payments totaled \$64,657.76 at Bisbee or an average annual pension of \$634.25.

A new Arizona Workmans Compensation Law went into effect during the latter part of 1925. Compensation costs for the year were \$72,274.10 or 2.57% of the net payroll with no fatalities, 220 serious and 220 minor accidents. The Employees Benefit Association continued to function with 88.1% membership, exclusive of Mexicans and \$52,115.22 in payments for sickness and accidents. For State and County Taxes, the mine was valued at \$28,272,415.87 and \$35,173,615.39 for the mine, mill and smelter. With a levy of \$1.692, taxes amounted to \$595,322.04.

F. F. Best, Chief Clerk was succeeded by L. T. Buell; A. C. Reifsnider replaced W. J. Spalding as Master Mechanic and C. W. Moon, Safety Inspector retired after 28 years of service and was replaced by A. J. Morgan.

1926

During 1926 the Copper Queen Branch production totaled 1,921,021 tons containing 109,269,035 lbs. Cu., 3,868,259 lbs. Pb. and 2,004,934 lbs. of Mn. The Douglas Reduction Works smelted 773,232 tons from the Copper Queen Branch and recovered 95,409,785 lbs. of Cu., 609,828 oz. Ag. and 33,499 oz. Au.

Mine production of 672,532 tons containing 58,972,923 lbs. of copper included 460,421 tons of limestone ores with an average grade of 5.38% Cu., 1.141 oz. Ag., .0538 oz. Au; of which 84,211 tons of 4.16% ore was mined by lessees. Of 17,792 tons of 10.87% lead ores with 6.40 oz. Ag. shipped to El Paso, 10,264 tons was mined by lessees. From the underground block cave 191,405 tons of 2.26% porphyry was sent to



1926 (Cont)

the concentrator, 2490 tons of 40.26% manganese ore shipped to Bessemer, Alabama and 244 tons of 48.76% precipitates shipped to Douglas.

Production from pit operations totaled 1,276,612 tons containing 48,800,687 lbs. of copper, of which 1,131,534 tons of 1.50% porphyry was sent to the concentrator and 116,078 tons with a grade of 6.42% Cu. was stored in the smelting ore bin. Precipitates from the Don Luis plant were 1057 tons with 70.74% or 1,495,425 lbs. of copper, 231 tons being credited to Czar water used on the leach ponds.

In addition to the above ores, the C & A smelter treated 18,574 tons of siliceous ore from the Sac No. 1 stockpile, returning 453,845 lbs. of copper.

Underground mining costs averaged \$8.514 per ton including \$2.543 for stoping, development \$1.359, tramping and hoisting \$1.165 and \$1.650 for taxes and general expense. Cost per lb. of Cu. for 95,258,905 lbs. of salable copper in bullion produced from the Copper Queen Branch, totaled 11.71¢ including 2.89¢ for smelting, 0.72¢ for depreciation and after a gold-silver credit of 1.10¢. Mining costs included \$93,007.47 in closing out the deferred account for development at the C & C shaft and concreting the Dallas shaft. Stopping efficiency averaged 5.03 tons per man shift and underground wages \$5.73. Mining of 191,405 tons from the block cave, averaged 22.09 tons per man shift with direct costs of \$1.86 and a total of \$2.14 per ton. Lead ores mined by the Company netted a profit of \$6.18 per ton, by lessees \$3.73 per ton and manganese ore \$2.30 per ton. Underground production was from the Uncle Sam, Southwest, Gardner, Lowell and Sacramento divisions. Bonus standards were revised in May and per shift earnings in stopes reduced from \$2.16 to an average of \$1.50 per shift.

In the limestone areas 35,743 ft. of development included 26,925 ft. of drifts, 8580 ft. of raises and 29 ft. in the Warren shaft. Of this footage 11,422 ft. was stope preparation and 746 ft. in the lead areas. Development work in the block cave porphyry totaled 7634 ft. and work by lessees included 638 ft. of drifts and 61 ft. of raises at the Boras and 3210 ft. of headings on the White Tailed Deer and other leases. Thirteen diamond drill holes or 6954 ft. were drilled by Lynch Bros. at the Lowell, Hedberg and Boswell. There were no new ore discoveries of importance and development from the Warren shaft during the past two years has been discouraging. The steel headframe was moved from the Lowell to the Warren shaft and sinking started January 27, 1927. Limestone ore reserves as of 1-1-27 were estimated at 1,195,938 tons with a grade of 5.07% for the 7 divisions and 3000 tons at the White Tailed Deer.

Mining of 1,140,332 yds. at the Sacramento pit cost \$0.728 per cu. yd. In addition to 1,247,612 tons of 1.96% ore, 398,694 tons of 0.719% leach was placed on No. 2 dump making a total of 1,047,431 tons with a grade of 0.736% copper on No. 2 dump and 1,815,202 tons at 0.918% on the No. 1 dump which is considered as completed. Precipitates at the Don Luis plant totaled 1057 tons with a grade of 70.65% copper, including 826 tons from the leach dumps and 231 tons from the Czar water; containing 1,495,425 lbs. of copper. Costs per pound of recoverable copper totaled 8.963¢ including 5.015¢ for operation, 1.168¢ depreciation, 1.03¢ smelting and 1.73¢ for Eastern charges. Deferred pit accounts had a remaining balance of \$4,457,066.63

The concentrator milled 1,322,342 tons of 1.61% porphyry and produced 209,425 tons of 8.86% concentrates with a 86.93% recovery and 6.24 ratio. Direct costs per ton were \$0.568 and total costs \$0.728. Bowl classifiers were installed in No. 1 section and the Callow cells were replaced with Mineral Separation and Forrester cells. Costs included \$13,000 in royalties paid to Callow.



1926 (Cont)

Expenditures under appropriations during 1926:

<u>Appropriation</u>	<u>Description</u>	<u>Expended</u>
156	Leaching Heap No. 1	\$ 20.39
160	Development Sac Hill East Ore Body	11,030.57
162	Placing of low grade material	18,464.72
179	Finer grinding equipment in Mill	30,904.34
180	X-Ray for Copper Queen Hospital	6,913.20
181	Pump & Motor for No. 6 Tailings dam	2,696.15
182	Renovating Copper Queen Hotel 2nd & 3rd floors	5,257.50
183	Flotation machines for concentrator	7,605.41
184	Two Mancha locomotives	3,839.48
185	Lead concentrator & sampling plant	13,537.05
187	Warren shaft	<u>19,854.29</u>
	Total - Distributed to:	\$120,123.10
	Operating Accounts	9,024.64
	Deferred Accounts	29,515.68
	Construction	81,582.78

A 150 ton lead concentrator at Bisbee for treating low grade carbonate was being constructed and at Douglas A. G. McGregor designed a 335,000 lead plant, including one blast furnace, crushing and sampling plant, Dwight Lloyd sintering machine and bag house.

Employees at Bisbee averaged 1696 with 1522 hires and 77.6% as American citizens. Under the Employees Representation Plan the Congress considered 42 matters and referred 29 to management who approved 26 suggestions. The Grievance Committee conducted eight hearings with none of the grievances appealed. Nine pensions were granted during 1926 making a total of 105 at Bisbee who were paid \$66,434.01 or an average of \$629.95 per pensioner. Compensation costs of \$93,902.24 or 3.36% of the net payroll was for one fatality, 55 serious and 68 minor injuries.

The Employees Benefit Association, now in effect for 17 years had a membership of 92.3% of the employees, excluding Mexicans. The dues were reduced from 2.0% to 1.6% and the Company's contribution from \$15,000 to \$10,000 annually. During the year \$51,696.21 was paid in sickness and accident benefits. The Medical department sustained a loss of \$19,422.07, part of which was the cost of the X-Ray machine and installation charges. For tax purposes the mine was valued at \$28,829,480 and \$35,322,745.43 for the mines, plant and Douglas smelter. With a levy of \$1.671, State and County taxes totaled \$590,256.97.

There were no major changes in supervisory personnel during 1926.

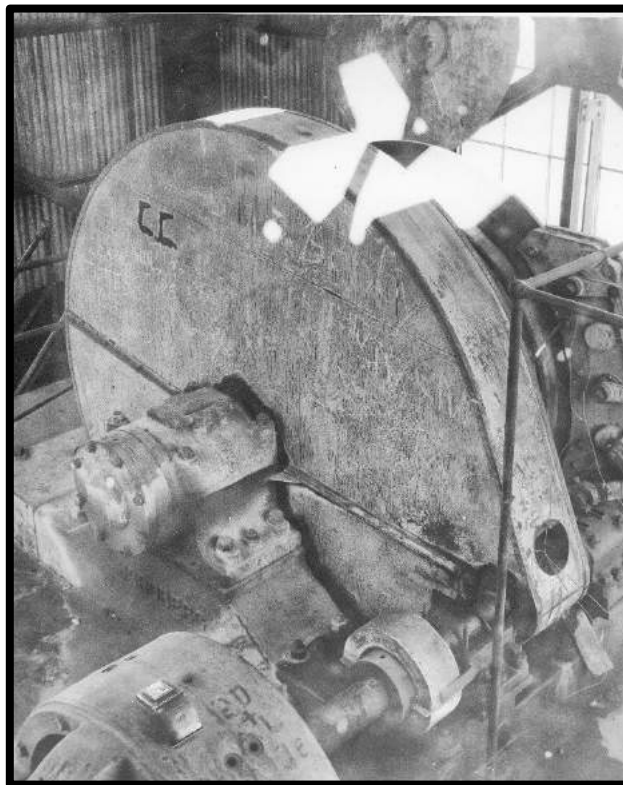
1927

Total production of 1,838,665 tons had a gross metal content of 106,351,930 lbs. of Cu., 4,031,453 lbs. Pb. and 3,288,162 lbs. of manganese. Production of metals in bullion at the smelters from the Copper Queen Branch ores was 89,295,837 lbs. of Cu. including 421,774 lbs. from 17,495 tons of siliceous ores from No. 1 stockpile shipped to the C & A smelter, 555,040 oz. Ag and 27,541 oz. Au. Costs per pound based on copper in the bullion averaged 12.44¢ including 2.49¢ for smelting, freight, selling and refining 1.79¢, depreciation 0.90¢ and after a gold-silver credit of 0.97¢ per lb. from all classes of copper ores.





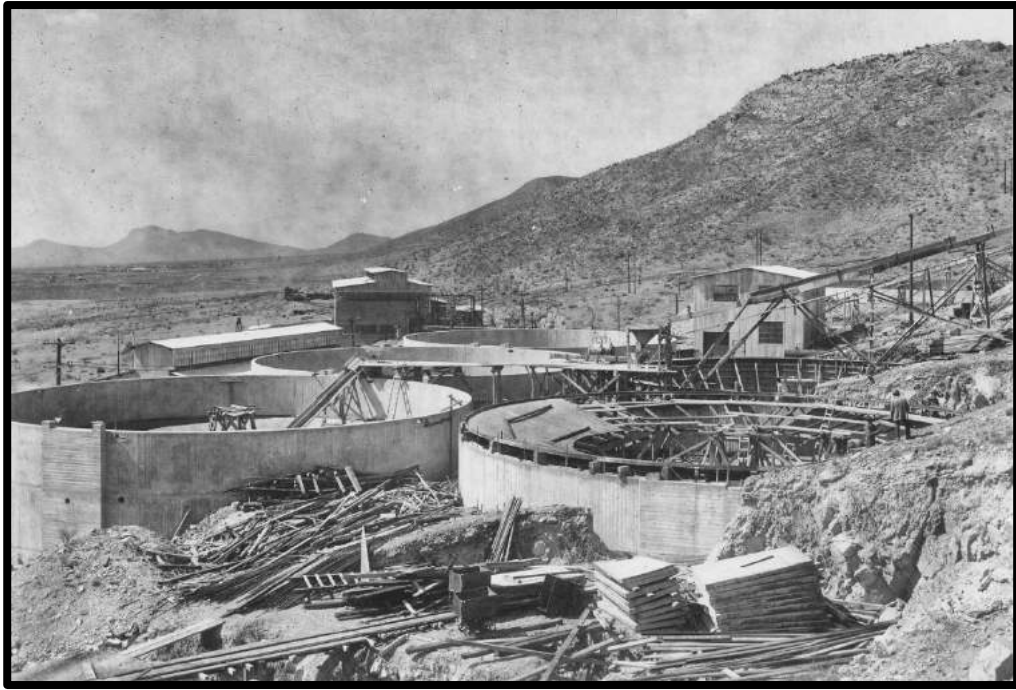
Headframe of the Sunrise Shaft, around 1972



The abandoned traction hoist on the top deck of the Sunrise shaft headframe in 1963.

(see p. 44, para. 2, 3 & p.45, para. 6)



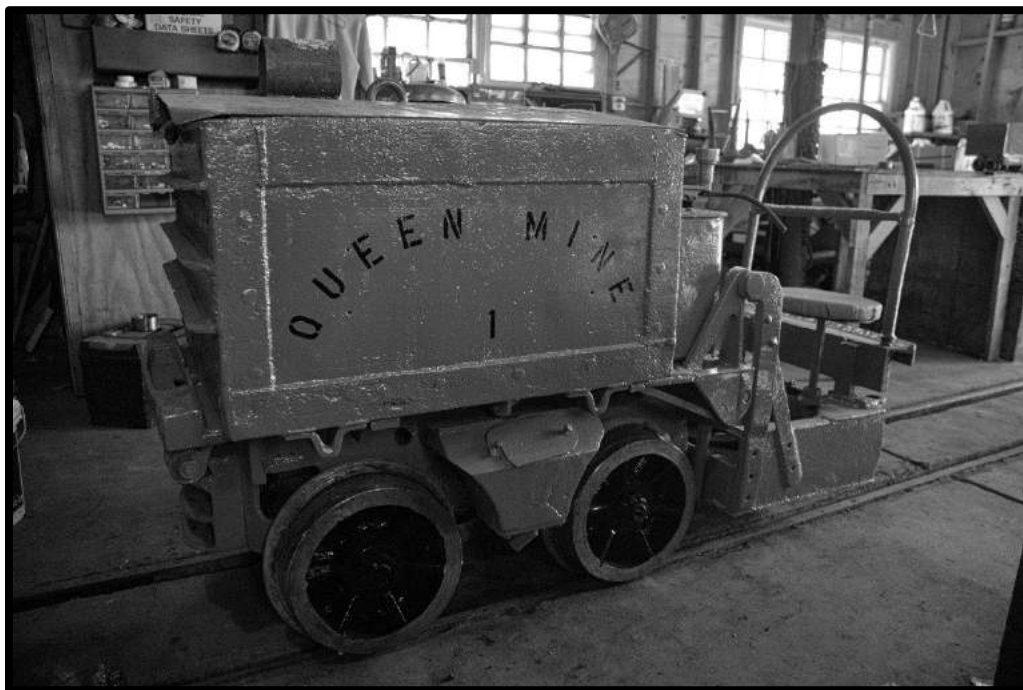


Two views of construction on the Sacramento Concentrator in 1921 (see p. 45, para. 6)





The abandoned Czar Mine hoist in 1963 (see p. 47, para. 3, p.57 para. 4 & p. 59 para. 6)



A rebuilt Mancha locomotive at the Queen Mine (see p.52, para. 2)



1927(Cont)

The selling price of copper averaged \$13.07 during the year and profits were estimated at \$563,378.68 from all operations. The underground mine production of 676,888 tons containing 52,694,975 lbs. of Cu. included 328,560 tons of copper ore mined by the Company and with an average grade of 5.46% Cu., 1.068 oz. Ag., .025 oz. Au.; 66,290 tons of 3.99% copper ores mined by lessees; 257,653 tons of 2.09% porphyry from the block cave and 215 tons of 75.22% precipitates containing 323,442 lbs. of copper from the Don Luis plant and credited to the mine from the Czar water used on the leach dumps. Of 15,351 tons of lead ores mined by the Company, 8720 tons of 12.30% Pb was shipped to the Douglas lead smelter and 6631 tons of 6.86% Pb to the Bisbee lead concentrator. Lessees mined 4751 tons of lead ore with a grade of 10.27% lead of which 2948 tons was shipped to El Paso, 1713 tons to Douglas and 90 tons to the Bisbee lead concentrator.

Pit production totaled 1,159,882 tons of 2.189% ore with gross copper contents of 50,778,375 lbs; 1,004,454 tons of 1.54% porphyry was sent to the mill; 1457 tons of 1.76% placed on No. 2 storage dump, 147,519 tons of 6.33% smelting ore shipped to Douglas and 6452 tons of 8.00% smelting ore stored in the smelter bin. Mining of 898,366 yds. with a stripping ratio of 0.75 cost \$0.682 per yd. The deferred stripping account is being charged off at 3.5¢ per lb. of copper and \$2,940,973.03 remained in this account at year's end. Mining above the 5150 was finished and it is planned to mine ores below the 5060 bench by glory holing.

Stripping included 578,103 tons of 0.327% waste, 66,200 tons of 0.673% leach placed on No. 1 heap and 199,525 tons of 0.648% leach placed on No. 2 heap. The minimum grade of material placed on No. 2 dump was reduced to 0.3%. With the purchase of the Mascot and Golden Calf claims, the use of Dump No. 1 as a disposal area was reactivated in September. At the end of 1927, 1,881,402 tons of 0.910% leach had been placed on Dump No. 1 and 1,246,956 tons with a grade of 0.708% Cu. on Dump No. 2. Production from the Don Luis plant from pit leach dumps amounted to 1895 tons of 75.95% precipitates containing 2,878,580 lbs. of copper. Including the Czar water 2110 tons of precipitates were shipped to Douglas.

Underground mining costs averaged \$7.778 including \$1.45 per ton for development and direct costs of \$6.794 or 7.80¢ per lb. of recoverable copper. Production came from the Southwest, Uncle Sam, Czar, Holbrook, Higgins, Gardner, Lowell and Sacramento. The Uncle Sam was shut down March 1 and the Czar shaft retimbered and reopened to replace the Southwest where the ores are about depleted. Remaining ore at the Higgins is in pillars and production totaled 106,210 tons since purchase of the property. The Sac winze was shut down and the hoist moved to the Czar. Lessees totaled 34, all of whom excepting 8, producing some ore from the Southwest, Czar, Holbrook, Night Hawk and White Tailed Deer. In the porphyry block cave or Division No. 8, the 650 lift was finished in March, preparatory work was in progress for the 850 lift and haulage ways and raises started on the 1000 level. The north end continues to be wet and subsidence required realignment of surface trackage and roads. Direct mining costs in the block cave were \$1.730 per ton; total costs \$2.228 or equivalent to 6.46¢ per lb. of copper.

Development footage in the limestone areas totaled 27,104 ft. with 10,078 ft. of headings. Little new ore was found except in the Sacramento 14-10 orebody. The Warren shaft was sunk 1641 ft. to the 1670 level and connected with the 1800 level drift from the C & C shaft. The flow of water required ordering additional pumping equipment. Expenditures for shaft sinking totaled \$210,916.65 or \$128.53 per foot and \$99,738.76 was spent for connecting drifts on the 1800 level. Reserves of limestone ores were estimated at 752,827 tons with a grade of 4.7% on January 1, 1928.



1927 (Cont)

Mining of lead ores which was stopped in October 1926 pending the completion of the lead smelter at Douglas and the 150 ton lead concentrator at Bisbee was resumed in May 1927, in an attempt to produce a sufficient tonnage from the Southwest by gouging all available lead showings. The Bisbee lead concentrator started June 13 and operated 141 days in treating 22,167 tons of 7.10% Pb ores with 82.85% extraction and 6.25 concentrating ratio at a daily rate of 157 tons and milling costs of \$3.82 per ton. Tonnage of lead milling ore from underground was limited to 6721 tons and the balance treated was from Shattuck Denn. The concentrator was down 43 days because of shortage of ore.

The Douglas lead smelter, construction on which was started March 12, 1926, was in operation on August 18, and treated 15,072 tons of N.M.B.M. and produced 4,863,691 lbs. of lead, 469,012 oz. Ag. and 2546 oz. Au. Costs averaged \$10.97 per ton or 3.404 cents per lb. of lead. Of this tonnage treated the Copper Queen Branch mined 10,433 tons. The shortage of lead ores started a search for other lead properties and a lease was taken on the Southwest Metals concentrator at Humbolt with tentative plans to remodel it for treating lead ores from the northern part of the State.

The Sac Hill concentrator milled 1,262,494 tons of 1.65% porphyry ore at a daily rate of 3719 tons for 319 operating days. With a 9.21 ratio and 87.57% extraction, 137,158 tons of 13.31% concentrates were produced at a milling cost of 59.7¢ or total costs of 68.8¢ per ton.

Unusual charges included:

Sinking Warren shaft	\$ 210,916.65
Development Work C & C 1800 level	99,738.76
Warren Shaft Drainage	18,209.05
C & C Water Bulkhead	5,294.24
Move Sac Winze Hoist to Czar	12,088.10
Flood protection in Mule Gulch	2,827.88
1000 level haulage tunnel for block cave	24,867.71
Surface track maintenance from subsidence	6,209.00
Mill equipment-Forrester cells, etc.	<u>12,930.00</u>
Total	\$393,081.39

Employees increased from 1792 to 1812 with a labor turnover of 4.93% per month. During the year 27 pensions were granted making 119 pensioners at Bisbee with payments of \$83,601.88 to 136 at the mine and smelter. The grievance committee held four hearings with one grievance being appealed to the Supreme Court. Compensation costs totaled \$106,251.13 with 4 fatalities at Bisbee, 39 serious and 19 minor accidents. The Employees Benefit Association continued with 89.6% membership, exclusive of Mexicans and paid out \$61,491.41 for sickness and accidents. State and County taxes for the mine and smelter were \$716,378.05 with the State rate up from \$0.67 to \$0.89.

A. W. Hudson died on July 15 and Claude Compton, Chief Chemist took over the supervision of the leach plant. G. W. Dowell, Manager of the Copper Queen Branch resigned on June 1 because of poor health after over ten years of service and was replaced by Joseph P. Hodgson.



1928

Production from the Copper Queen Branch during 1928 from all sources totaled 1,785,739 tons containing 115,570,399 lbs. Cu., 4,277,156 lbs. Pb., 684,006 oz. Ag., 32,711 oz. Au and 3,049,450 lbs. of manganese. Salable copper from the Douglas smelter including custom ores was 112,581,374 lbs. and with an average cost of 10.69¢ and selling price of 14.87¢ profits were estimated at \$4,708,292.64. Costs for Copper Queen ores averaged 10.61¢; 11.20¢ for mine ore, 9.83¢ for copper from the block cave and 8.79¢ for copper from Sac Pit. Included in the 10.61¢ cost is 6.43¢ for mining, smelting 1.58¢, freight, selling and refining 1.75¢, depreciation 0.68¢ and a gold-silver credit of 0.84¢. With lead ores purchased, the lead department produced 14,605,604 lbs. of salable lead at a cost of 6.48¢ per lb. The average domestic price was 6.316¢ and a loss of \$74,385.15 sustained during the year.

The underground mine production of 645,233 tons containing 44,937,042 lbs. of copper included 273,053 tons of copper ore with a grade of 4.63% Cu., 0.968 oz. Ag. and .0356 oz. Au; 67,533 tons of 4.43% copper ore mined by lessees; 280,536 tons of 2.213% porphyry ore from the block cave, 779 tons of 70.51% precipitate from the Holbrook and underground leaching and 3752 tons of 40.64% manganese ore, which was shipped to Bessemer at a profit of \$2.33 per ton. Of 16,159 tons of 11.34% lead smelting ore, 1020 tons was mined by lessees who also mined 378 of the 3421 tons of 8.95% lead ores milled at Bisbee.

Production of 1,140,506 tons from Sac Pit contained 70,633,357 lbs. of copper including 981,818 tons of 2.07% mill ore, 149,921 tons of 6.50% smelting ore shipped to the Copper Queen smelter; 1167 tons of 3.14% ore shipped to the C & A smelter and 7600 tons of 66.87% precipitates of which 53 tons was recovered by a lessee. Shipments of siliceous ore from No. 1 mill stockpile to the C & A smelter continued with 47,017 tons with a grade of 1.64% being reclaimed during 1928; the stockpiled ore being too badly oxidized to treat in the concentrator.

Underground production was from the Southwest, Czar, Holbrook, Gardner, Lowell, Sacramento and Higgins. The Southwest is about exhausted and the remaining tonnage will be leased. The Czar was reopened and the Lowell produced 33,000 tons from the 13-10 and 13-30 areas with the fire country being reopened for mining. A lease in the Backbone claim was given to the Wolverine Arizona Mining Company to rob pillars left in this area. The Sacramento continued to be the largest producer. Twenty-four leases were active including the Night Hawk and the Lytle contract. In the block cave area, the 725 lift was completed in April, the 850 lift started and preparatory work underway for the 950 lift. A small block of 6989 tons of 5.88% ore on the 800 level was also undercut and caved. Preparatory work was underway for block caving part of the East Ore Body and to finish the pit by glory hole methods.

Development work totaled 33,830 ft. with 14,764 ft. in the limestone and 1416 ft. in the lead areas. No new ore was found in the Uncle Sam or Southwest; the Holbrook was being reopened during the latter part of the year and some ore was found on the 400 level of the White Tailed Deer. Development work in the Lowell was disappointing with but little new ore found in the 10-3 country. The Warren shaft was sunk 477 ft. to a depth of 2147 ft. with a total cost of \$411,502 or \$191.66 per foot. Stations were cut on the 900, 1800 and 2200 levels; a pump station and sump on the 2200 level where two 1000 GPM pumps were installed. Shaft sinking was completed June 3 and 3175 ft. of development drifts were driven with negative results.

Pit mining of 626,804 yds. was by two and three shovels per day and at a cost of \$0.857 per yd. including \$.096 for departmental expense. Remaining deferred stripping amounted to \$1,653,382.14 at the end of the year. The stripping ratio averaged 0.27



1928 (Cont)

and shovel production 782 yds. per shift. In addition to 1,132,906 tons of ore, 100,514 tons of 0.62% leach was placed on Dump No. 1 and 130,472 tons of 0.45% leach placed on No. 2 dump. Mining above the 5120 and 5090 benches was finished and the 5060 drop cut started. Trackage over the subsidence area was abandoned, grading for a realigned Southern Pacific track from the Lowell depot to the Warren line was started; the Arizona Edison was moving their power plant to Naco and the ice plant to the Denn area. A new porphyry mine unit was created to supervise the Southeast Extension, the North Cave Block and the Sac Glory Hole operation.

The Don Luis cementation plant was enlarged to a capacity of one million gallons daily by the addition of two new scrap iron tanks, 6 concrete launders and a blower for agitation. Water to the dumps included 26.85 million gals. from the Czar containing 3.06 lbs. per M gals. and 291.723 M gals. from the C & C which was slightly acidified by adding acid. Irrigation of No. 2 dump was started in April and No. 1 dump yielded 46.84% of its contained copper after the 8th wash. The plant produced 7609 tons of 69.09% precipitates with 10,326,979 lbs. of recoverable copper at a cost of 7.74¢ before depreciation. A small launder plant for water from the Czar and Holbrook was started in June to serve leaching of the Holbrook stopes.

Sac Hill concentrator milled 1,263,729 tons of 2.10% porphyry at a daily rate of 3677 tons during 324 operating days. With a ratio of 7.93 and 91.26% extraction, 159,138 tons of 15.20% concentrates was made with a milling cost of \$0.531 per ton. Experimental work indicated no improvement with McIntosh cells compared with Forrester short wave liners were tried in the primary ball mills and the secondary mills were converted to 2-1/2 inch balls for finer grinding.

The Bisbee lead concentrator operated one to two shifts for 149 days and operations were terminated after 5 months because of shortage of ore. The mill treated 13,039 tons of 6.61% lead ores from the Copper Queen and Shattuck Denn at a daily rate of 147 tons, a ratio of 7.19, extraction of 88.67% of the lead and a milling cost of \$2.84 per ton. Experimental work continued after the plant was shut down.

The Douglas lead plant smelted 48,440 tons of N.M.B.M. and produced 14,769,966 lbs. of Pb., 1,160,201 lbs. of Cu., 2,800,945 oz. Ag. and 13,958 oz. Au. with an extraction of 88.82% of the lead and a cost of \$8.93 per ton. On February 28 a development department was established in charge of Percy Williams of Tucson to look for lead properties and 59 prospects were visited. An option was secured on the Reese & Snyder claims on the east slope of the Santa Rita mountains near Sonoita and production was limited to six cars. Work was also done on the George Dunn property in Hunter Canyon of the Huachuclas and the Duran group near Paradise.

Unusual expenditures during 1928 included:

Sinking Warren shaft	\$ 72,065.88
C & C Development	17,034.16
Raising Sac skip compartment & sinking	16,396.95
Move Sac Winze Hoist to Czar	5,967.04
Warren Shaft Pumps and Drainage	47,332.87
C & C Water Bulkhead	939.71
Moving part of Sac change room to Gardner	7,980.28
Addition to Foreman's office	1,348.51
Warren Shaft Division expense	64,266.83
Obsolete Materials	11,289.89
Concentrator McIntosh cells & raising trestle to No. 6 tailings pond	30,781.03



1928 (Cont)

Preparatory work N Block of East ore body	\$ 23,297.97
Total	\$ 299,501.12

Employees increased from 1812 to 1972 during the year and a wage increase of 10% was effective October 1st. The Employees Representation Committee referred 26 recommendations to management and 24 were accepted. Grievances considered by the Committee were limited to two and the labor department at the Mine and Smelter were consolidated under the supervision of H. C. Henrie. Twenty one pensions were granted and with 14 deaths, 143 pensions were active and payments to these pensioners totaled \$89,550.76.

Compensation costs for the mine and smelter amounted to \$65,564.00 with 2 fatalities, 25 serious and 8 minor accidents at Bisbee. The Employees Benefit Association was in its 19th year of operation with a 91.3% membership excluding Mexicans and \$63,980.72 was paid for sickness, accident and death benefits. With a valuation of \$32,000,000 taxes amounted to \$594,756 for the Copper Queen Branch.

D. W. Irwin, General Superintendent resigned to accept a position with the Roan Antelope Copper Mines Ltd.

1929

Production from all sources totaled 2,058,231 tons with gross metal contents of 127,605,697 lbs. Cu., 2,259,967 lbs. lead and 2,325,857 lbs. of manganese. Salable metals from copper ores smelted at Douglas were 120,089,009 lbs. copper, 520,360 oz. Ag., 31,395 oz. Au. Costs per lb. of copper based on salable metals average 12.30¢ or 13.54¢ for the limestone production, 9.08¢ for the West Ore Body and 11.38¢ for the S.E. Extension; these costs include smelting 1.91¢; freight, selling and refining 1.68¢; depreciation 0.65¢ and a gold-silver credit of 0.65¢. With a cost of 12.45¢ for all ores smelted and a selling price of 18.31¢, profits were estimated at \$7,277,745.87.

Underground production totaled 953,540 tons with copper contents of 62,302,346 lbs. The Company mined 354,355 tons from the limestone ores with a grade of 4.44% Cu. 0.752 oz. Ag, .0323 oz. Au and lessees mined 105,727 tons with a grade of 5.21%. The block cave of the S.E. Extension produced 422,616 tons of 2.035% porphyry and the new north block 51,354 tons with a grade of 1.243%. Of this tonnage 24,235 tons of 2.34% porphyry was shipped as smelter flux. The Company mined 9005 tons of 10.57% lead ore and lessees 1558 tons at 11.45% together with 5398 tons reclaimed from low grade stock pile increased the shipments to the Douglas lead smelter to 15,961 tons with a grade of 7.08% Pb. Shipments from the Holbrook precipitation launders totaled 674 tons of 61.44% precipitates. Lessees mined 2853 tons of 40.76% manganese which was shipped to Bessemer.

In the Sac pit, shovels mined 753,903 tons of 2.30% porphyry and 341,709 tons of 2.69% material was glory holed. Of the 1,095,612 tons of 2.423% porphyry, 100,633 tons of 4.12% ore was shipped as direct smelting, 1131 tons of which went to the C & A smelter and 994,979 tons of 2.75% ore sent to the concentrator. Precipitates totaled 9079 tons of which 9008 tons of 67.36% precipitates was from pit dumps.

Mining costs averaged \$8.60 per ton including \$1.80 for development and exploration but excluding depreciation. Stopping efficiency was 4.9 tons per man shift. Production came from the Czar, Holbrook, Gardner, Lowell, Sacramento and about 8000 tons from the Southwest and Uncle Sam. The Sacramento division continued as the largest producer, the Lowell shaft pillar was finished and considerable tonnage came



1929 (Cont)

from the Gardner 11-40, 12-30, 13-44 and 14-44 ore areas. Thirty five leases were active during the year. A mine fire in the Sac 14-10 area in June and one in the Lowell on October 13, caused little interruption to operations.

Development footage of 31,773 ft. was in the limestone areas and 2946 ft. in the lead areas. Forty six diamond drill prospect holes or 7675 ft. were drilled in the ore zones. Development work of 10,887 ft. during the year from the Warren shaft cut mineralization but no ore on the 900, 1100 and 1800 levels. Small tonnages of new ore were developed in the Czar and Holbrook divisions. Reserves of limestone ores were estimated at 900,104 tons with a grade of 4.6% copper. The lead ore reserves were about depleted with the Company mining in the Higgins and lessees in the Czar and Southwest.

In the S.E. Extension block cave the 850 lift is nearing completion and preparatory work underway for the 950 lift and a new haulage way started on the 1200 level, with diamond drilling to outline the ore limits for the grizzly level above the 1100. Churn drilling is also in progress from surface over the porphyry areas. Mining costs for the 422,616 tons averaged \$1.93 per ton. In the North end of the East Ore Body the first block failed to cave after undercutting and development of the second block is being rushed to extend the undercut. Development and undercutting produced 51,354 tons of 1.24% porphyry at a cost of \$0.93 per ton.

The 5040 bench of the Sac Pit was completed in September. Shovel shifts totaled 602 during the year in handling 365,048 solid yds. at a rate of 606 yds. per shovel shift including 31,664 yds. of waste and 333,834 yds. of ore with a stripping ratio of 0.09 and cost of \$1.005 per yd. In addition to the 753,903 tons of 2.30% ore, 70,286 tons of 0.38% waste was placed on the dumps. Since the start of shovel operations in 1923, excavation of the West Ore Body totaled 14,319,597 solid yds; 10,722,016 yds. of waste and 3,597,581 yds. of ore or a stripping ratio of 2.98. During 1929 the \$1,613,685.66 remaining in the deferred stripping account was written off to operating costs.

Glory holing of the ore below the 5040 bench was by six mill holes with the grizzlies on the Sacramento 400 level and storage raises above the 500 level. Ore beyond the mill hole limits was loaded into 3-1/2 ton cars by a Marion No. 3 shovel and trammed by an 8-ton Fordson tractor. In addition to the development work preparatory to glory holing, skips were installed in the cageway compartments of the Sac shaft, the cage-manway compartment raised from the 1800 to the 1600 to give a full sized shaft from the collar to the bottom, a concrete pocket constructed on the 600 level and a new hopper and conveyor system installed at the shaft collar. Mining of 341,709 tons of 2.69% porphyry cost \$0.98 per ton.

The concentrator with 338 operating days milled 1,445,425 tons of 2.15% ore at a rate of 4049 tons daily. With an extraction of 91.32%, 6.58 ratio and milling cost of \$0.493, 219,991 tons of concentrate had an average grade of 12.92% copper. Six foot Dorr classifiers in closed circuit with the primary mills increased the tonnage by 10% and Minerac was tried with no improvement over Xanthates.

During 9 months of shovel operations, 47,464 tons of 0.47% leach was placed on No. 1 & No. 2 dumps. The Don Luis plant produced 9008 tons of 67.36% precipitates. Leaching of the Warren dump (No. 7) was started in August from the Junction flume water and pregnant solutions pumped to the Don Luis plant. From 101.545 million gallons of irrigating water, 2,658,402 lbs. of copper was recovered in precipitates.



1929 (Cont)

With but 15,961 tons of lead ore from Bisbee, the Douglas lead plant served as a custom lead smelter in treating 43,143 tons of N.M.B.M. with recoverable metals of 12,827,972 lbs. Pb., 2,215,807 oz. Ag., 10,628 oz. Au. at a cost of \$7.91 per ton. The exploration department under Percy Williams examined 63 properties; options were taken on Cerro Gordo about 20 miles south of Douglas; Ray-Silver Lead near Ray; Bradford near Stein's New Mexico and Red Hill near Hachita New Mexico. Very little lead ore was developed. With lead quotations averaging 6.82¢ and costs of 7.63¢ per lb., the operation sustained a loss of \$145,940.02 including development charges of \$33,957.32 at the Copper Queen Branch and \$93,867.36 for outside exploration.

Unusual costs included:

Warren Shaft Division	\$ 272,092.70
Sacramento Fire	23,794.53
Lowell Fire	2,337.26
Drainage-Warren Shaft	25,329.90
Ventilation Blowers - Sac & Gardner	12,297.28
Relocating main S. P. track	13,881.93
Preparatory work N Block - East Ore Body	<u>209,653.91</u>
Total	\$559,387.51

Appropriations included an Assistant Manager's residence, equipment for the Night Hawk lease, 8-ton tractor for glory hole mining, portable compressor for Red Hill lead prospect and test work at the concentrator. The Copper Queen dispensary was enlarged to replace the Lowell site hospital at a cost of \$64,871.75.

The number of employees averaged 2016 with a labor turnover of 5.6%. Three 5% wage increases were effective in February, March and April and two 5.0% reductions in May and June. Accidents at Bisbee included 3 fatalities, 41 serious and 5 slight with compensation of \$80,700.00 for the mine and smelter. The Employees Benefit Association paid out \$53,749.82 for accident and sickness. Nineteen pensions were granted during 1929 and with 7 deaths, pensioners totaled 155 and were paid \$96,005.14. Taxes, with a levy of \$2.096 and 30 million valuation amounted to \$628,727.19.

The position of Assistant Mine Superintendent was created in May and filled by George B. Lyman. In September, W. M. Saben formerly Assistant Manager at Morenci became Assistant Manager of the Copper Queen Branch. J. B. Hodgson continued as Manager and P. G. Beckett as General Manager.

1930

Production from all sources totaled 1,475,296 tons containing 84,195,921 lbs. Cu., 233,696 lbs. Pb. and 12,620 lbs. of manganese. Salable metals from 536,890 tons of copper ores treated at the Douglas smelter was 70,546,450 lbs. Cu., 334,293 oz. Ag and 16,055 oz. Au. Cost per lb. of copper including custom ore and the lead smelter product averaged 11.94 cents or 11.84¢ for Copper Queen Branch ores. With a selling price of 12.98¢, profits were estimated at \$806,084.15. The unit cost of 11.84 cents is the average of 12.60¢ for the limestone copper; S.E. Extension block cave 9.91¢; Glory Hole 9.33¢; copper ores mined by lessees 8.95¢ and 6.08¢ for precipitates.

The Company mined 224,153 tons from the limestone areas with an average grade of 4.957% Cu., 0.930 oz. Ag., .0375 oz. Au and lessees produced 55,729 tons of 6.17% ore.



1930 (Cont)

Of 979 tons of 11.93% lead ore, 729 tons was mined by lessees. In the porphyry areas 605,675 tons of 1.55% ore mined from the Glory Hole included 93,248 tons of 1.53% porphyry shipped as smelter flux. The S.E. Extension mined 560,871 tons of 2.12% ore from the block cave, of which 1866 tons was classified as smelting ore. Production from the north block cave was limited to 18,151 tons of 1.03% milling ore. Manganese ore amounting to 317 tons with a grade of 1.99% was shipped to Bessemer. Copper precipitates totaled 9421 tons; 8873 tons at 64.93% from the Don Luis plant, 474 tons at 53.93% from the Holbrook plant and 74 tons by lessees.

Mining was essentially in the Sac, Czar, Holbrook, Gardner and Lowell. Curtailment of operations required confining stoping to a few low cost high grade sections. The Gardner was closed down in July, the Czar in August along with curtailed development, mining was concentrated in the Holbrook and Sac divisions on all levels from the 1400 to the 1800. Direct stoping costs averaged \$1.61, total costs \$7.10 and production rate 6.8 tons per man shift. Thirty-two lessees worked on the fringes of abandoned stopes in the Southwest, Uncle Sam and Higgens and with the depletion of reserves production of lead ores was limited to 979 tons. With lack of markets, manganese leasing in the Higgens was discontinued in April.

Development in the limestone areas included 31,365 ft. of headings, 4434 ft. of churn drilling and 15,297 ft. of diamond drilling. Driving 2660 ft. from the Warren shaft indicated nothing more than a body of pyrite on the 2200 level. The work was stopped in April when an unexpected flow of water exceeded the capacity of the C & C pumps. Chiracahua No. 2 D.D. hole on the Rough Rider claim was stopped at 3160 ft.

Development for glory hole mining required 11,188 ft. of churn drilling and 1346 ft. of headings for six more draw points, also drainage raises from the 600 level Holbrook to the 500 haulage level. In the S.E. Extension, a new haulage level was started on the Sac 1200 level for the lowest cave block; 7704 ft. of drifting and 2489 ft. of raises driven to the 1100 grizzly level with the undercut 15 ft. above. A new concrete loading pocket was constructed below the Sac 1400 level. In addition, 3058 ft. of churn drilling and 864 ft. of diamond drilling served to develop this section of the porphyry. Mining costs were \$1.52 per ton as compared with \$2.04 during 1929.

Development assigned to the N block of the East Ore Body included 10,541 ft. of churn drilling, 923 ft. of diamond drilling and 214 ft. of development headings. This block was planned as a producing unit in 1930 but work was limited to seven months of preparatory work. Costs per ton for all porphyry ores averaged \$1.19 per ton. Churn drilling started in 1929 was discontinued in October 1930. The 24,787 ft. drilled in 1930 cost \$60,538 or \$2.44 per ft.

The concentrator treated 1,089,910 tons of 1.84% ore or 3824 tons per day at a cost of 49.9 cents per ton. The recovery was 89.25% with a 7.13 ratio and 11.71% grade of concentrates. The Gardner and Holbrook change rooms were enlarged. At the diesel plant one 4 FH 2250 h.p. 2250 V 1500 KW engine was installed and two 2000 KVA generators replaced. Plant output totaled 27,444,480 KWH at a unit cost of 0.568¢.

No leach was placed on Dumps 1 & 2 and leaching of Dump No. 7 was successful and an appropriation requested for preparatory work on the mill storage dump and No's. 4 and 5 where irrigation was started in June and 59.936 million gallons of 9.05 lbs. returned to the Don Luis plant. Water from No. 7 dump totaled 246.278 million gallons containing 30.44 lbs. of copper and 233.747 million gallons from No. 1 and 2 dumps averaged 16.26 lbs. of copper per 1000 gallons.



1930 (Cont)

At the smelter the new roaster reverb units were placed in operation in March. The lead department was closed on April 6, 1930 due to shortage of ore after smelting 13,945 tons of 19.82% lead ores at a cost of \$7.12 per ton.

Unusual charges to operating costs included:

Warren shaft division expenditures	\$ 89,987.41
Spillage from C & C shaft	52,093.90
Preparatory work North Cave block	60,105.45
Preparatory work 1100 lift S.E. Ext. cave block	144,317.33
West ore body cleanup-Glory hole	5,391.33
Surface churn & diamond drilling-limestone areas	82,414.10
Surface churn drilling-Porphyry areas	60,538.00
Raising No. 6 Tailings Launder	5,497.79
Gardner change room-App. No. 233	8,722.69
Total	<u>\$509,068.00</u>

The Bisbee payroll was reduced from 2261 employees to 1114 at the end of 1930 with an average of 1458 at Bisbee. At Douglas, the force was reduced from 1229 to 551 with an average of 673 for the year. Two wage reductions, 5% on May 1 and 10% on June 1, restored the wage scale to that in effect in October 1928. Accidents resulting in 2 fatalities, 11 serious and 3 slight cost approximately \$57,126 and \$62,958.06 was paid from the Employees Benefit Association for accident and sickness benefits. Valuation for the mine for tax purposes was \$23,632,790 or 30 million for the mine and smelter plants. With a tax levy of \$1.993 per hundred, State and County taxes totaled \$597,808.62.

W. J. Scott, General Foreman of the Mining Department retired in November because of ill health and was not replaced.

1931

Production from all sources totaled 916,661 tons containing 71,898,550 lbs. Cu. and 511,709 lbs. of lead. Salable copper produced in bullion amounted to 69,065,591 lbs. at a cost of 10.33¢. During the first 9 months 46,001,580 lbs. was produced at a cost of 10.33¢ and after the merger with C & A, 23,064,011 lbs. cost 7.83¢ per lb. The Company mined 214,496 tons of 6.93% copper ore from the Campbell, Junction, Czar and Sacramento of which 2462 tons with a grade of 4.27% was shipped to El Paso. Lessees mined 45,006 tons of 7.53% ore and 736 tons of 34.7% lead ore which was also shipped to El Paso. Tonnage includes 12 tons of 63.5% scrap. The Holbrook cementation plant produced 1026 tons of 61.22% precipitates and the Don Luis plant 5188 tons with a grade of 68.59% Cu.

Of 105,523 tons of 1.68% porphyry mined in the glory hole 58,015 tons at 1.06% was shipped as smelter flux. In the block cave, 542,227 tons averaged 2.256% copper of which 20,069 tons of 4.18% higher grade material was smelting ore. Production from north block cave was limited to 2447 tons of 0.77% porphyry.

After November 1st the Sacramento, Gardner, Lowell, Czar and Holbrook were closed down and mining limited to the Junction and Campbell divisions. Stopping costs averaged \$4.51 per ton before the merger and \$4.37 during the last 3 months of 1931. Production of metals from the Copper Queen Branch in bullion were 69,065,591 lbs. of Cu., 642,253 oz. Ag., and 22,862 oz. Au. Per pound costs were 9.36¢ including primary production 3.21¢, smelting 1.20¢, freight, selling and refining 1.61¢, taxes and



1931 (Cont)

general expense 1.81¢ and after a gold-silver credit of 0.84¢ the selling price of copper averaged 8.09¢, decreasing from 9.83¢ in January to 6.58¢ in December. During the first part of the year 16 leases of a total of 30 were active and all except three were later cancelled.

Development work totaled 34,883 ft.; 14,861 ft. of headings and 5907 ft. of diamond drilling in the limestone areas; 13,216 ft. of headings and 899 ft. of diamond drilling in the porphyry and 10,798 ft. of stope preparation which is included in the above development footages. In the glory hole, scrapers replaced track haulage to recover higher grade ore in the west end. The 850 lift of the S.E. Extension block cave was completed early in the year; the greater portion of the tonnage came from the 950 lift and higher grade ore outside of the caving block was mined on the 950 and 1000 levels by a modified caving system. The grade in the north block cave was low and operations discontinued. Preparatory work for continued mining of flux ore from the S.E. Extension included the cutting of a station on the Junction 960 level, storage pocket and raise from the 1200 level and starting a haulage way on this same level. Pumping during the latter part of the year averaged 3524 GPM; 336 from the Czar, 649 from the C & C and 2539 GPM from the main Junction pumping plant.

The concentrator treated 578,842 tons of 2.07% porphyry during 124 operating days at a rate of 3429 tons and 43.8¢ cost per ton. With a recovery of 89.58% and 7.38 ratio of concentration, 78,614 tons of concentrates contained 13.69% Cu. The plant was shut down on October 28, 1931.

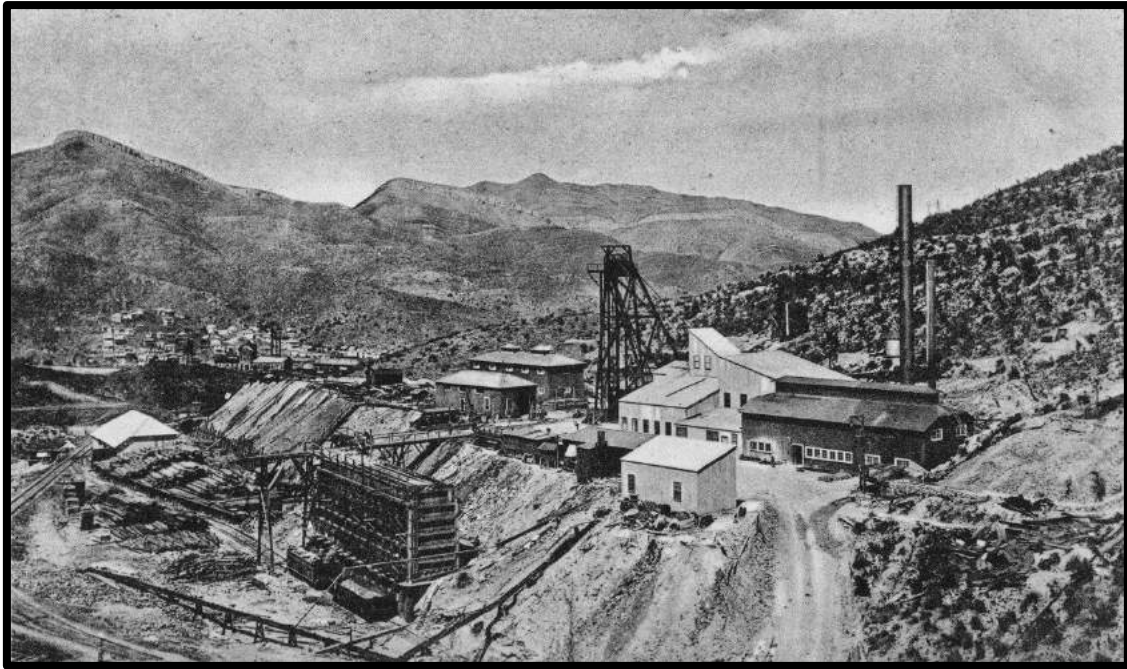
No. 1 heap was irrigated until August when the ferric iron became excessive. Leaching of No. 2 and No. 7 dumps was continuous until December when leaching operations were suspended. No. 7 dump was the primary producer and the Don Luis plant recovered 6,974,491 lbs. of copper from 454.356 million gallons of solutions averaging 15.58 lbs. per thousand gallons. The Holbrook plant operated continuously and produced 1026 tons of 61.2% precipitates.

Unusual expenditures during 1931 included:

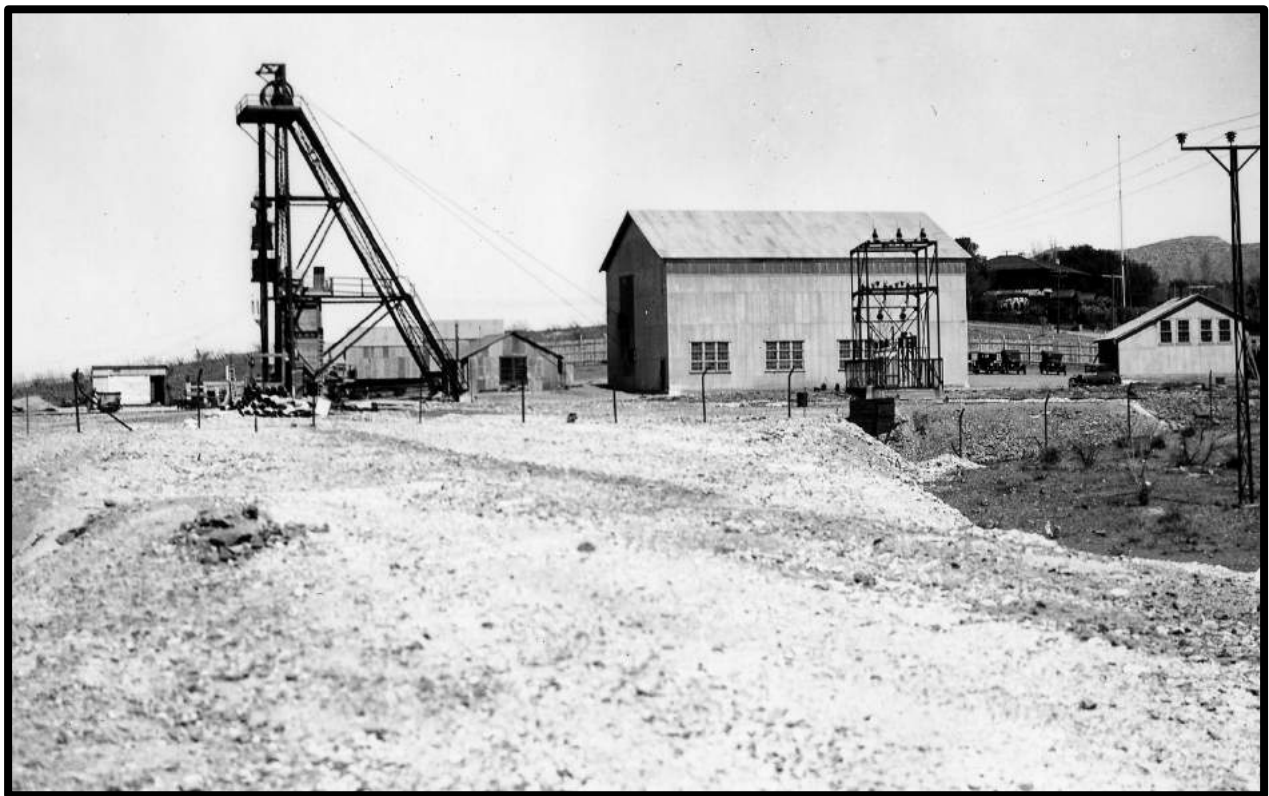
<u>Appropriation</u>	<u>Description</u>	<u>Expended</u>
235	1500 GPM pump C & C 1800 level	\$ 3,361.76
237	Testing gas in Diesel Engine No. 1	14,582.57
238	Installation of Natural Gas System	16,874.91
239	Changes in S. P. Tracks-Subsidence	26,842.26
242	Gas Installation at Junction	6,231.62
244	Move Lowell change room to Campbell	6,423.92
245	Junction shaft 960 pocket	3,858.70
246	Two water doors Campbell 1900 & 2000 levels	5,077.76
247	Ramp and bin at Campbell for stope fill	<u>2,582.99</u>
	Total	85,836.49
	Preparatory development lower lift of Block Cave	\$138,456.45

With the merger of the Copper Queen and C & A on October 1, 1931, depressed metal prices and reduction in operations, the year was a difficult one for the Copper Queen Branch. In January employees totaled 1114 and 857 at the end of September when 687 C & A employees were available. At year's end the 1053 employees were working one-half and two-thirds time with the decreased rate of production. In the reduction of forces 96 bonuses, amounting to \$93,296.46 were given to C & A employees and 35 awards to Copper Queen employees totaled \$32,876.88. Salaried employees no longer needed were granted substantial amounts. One reduction of 10% was effective June 1st





The Lowell Mine equipped with a steel headframe

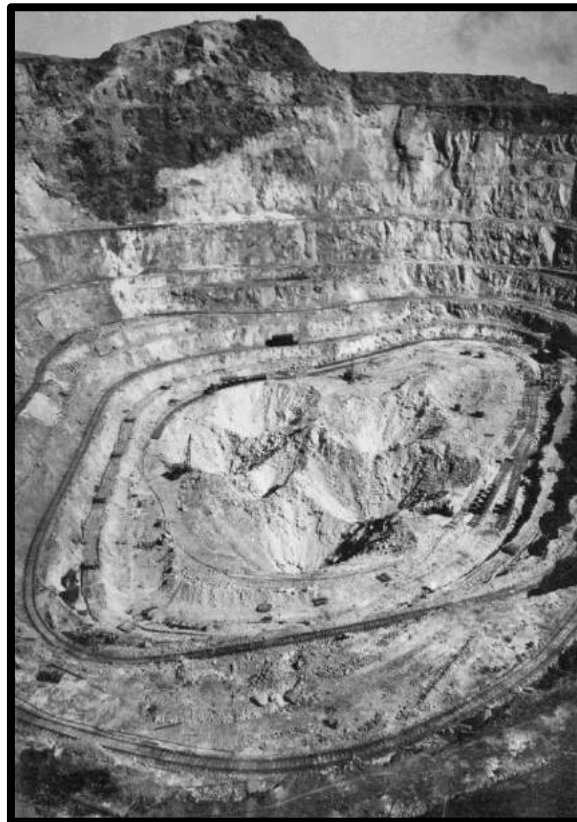


The steel headframe from the Lowell Mine after it was installed over the Warren Shaft (see p.51, para. 5)





Leach dump no.1 in 1928 (see p.49, para. 6)



The craters in the bottom of the Sacramento pit are the “gloryholes” large raises that drop the 500 level of the Sacramento (underground) Mine .(see p. 60 para. 7 & p.61, para. 5)



1931 (Cont)

for day's pay and salaried employees and a 9% reduction made in day's pay rates on October 1st.

Fifty-two pensions were granted during the year and with 12 deaths, 186 pensions were in effect in December. Payments amounted to \$106,955.62. The Copper Queen pension plan was terminated on July 1, 1931. Compensation costs for the mine and smelter totaled \$89,608 with 3 fatalities, 17 serious and 4 slight injuries at Bisbee. The Employees Benefit Association continued with a surplus of \$96,626.32 at year's end and annual expenses of \$68,469.33. For both mines, valuations of \$54,753,380 were about equally divided. The tax levies were: State \$0.95, County \$0.80, School District No. 2 \$0.359, School District No. 27 \$0.617, with taxes amounting to \$754,651.92 for the mines and smelter, including \$148,342.23 for the C & A during the three months after its acquisition.

Wm. A. Saben, Assistant Manager, was transferred to the General Manager's office at Douglas and H. M. Lavender, Chief Engineer for C & A was made Mine Superintendent of the Copper Queen Branch. On October 1 the Copper Queen Branch was separated into the Mining and Smelting departments. Following the merger the C & A hospital was closed down.

1932

Production from all sources during the year totaled 275,959 tons containing 52,221,461 lbs. of copper and 801,351 lbs. of lead. Stoping was limited to two divisions; the Campbell mining 174,825 tons of 10.02% copper and the Junction 69,776 tons at 7.89%. Leasees mined 8903 tons of 10.74% copper ore in the Don Luis area and 6026 tons of 6.65% lead ore with 12.75 oz. Ag. from the Southwest and Czar divisions. Precipitates totaled 734 tons with a grade of 46.28% Cu., 734 tons from the mine and 84 tons from the Don Luis plant. Scrap and smelter cleanup amounted to 15,611 tons with a grade of 9.38% Cu.

Bullion from Copper Queen Branch ores smelted contained 42,307,106 lbs. Cu., 802,753 oz. Ag. and 15,913 oz. Au. Costs per pound averaged 7.10¢ including custom ore or 6.69¢ for Bisbee copper, including 2.01¢ for primary production, smelting and converting 1.06¢, freight, selling and refining 1.36¢, taxes and general expense 2.37¢, depreciation and idle property 0.90¢ and after a gold-silver credit of 1.27¢. With copper prices averaging 5.55¢ the operating loss was \$61,142.70 before depreciation and maintenance of idle property.

Mining in the Junction was on the lower levels on the Erie Cattle and Protection claims and from the 1600 and 1700 levels on the Oregon claim during the last half of the year. Most of the Campbell tonnage came from the 1500 to the 2200 levels. Stoping efficiency of 7.61 tons per man shift was effected by changing to incline with electric lights and the use of electric and air slushers started. Hoisting was discontinued at the Sacramento shaft on January 12.

Development footage included 16,073 ft. of headings, 3859 ft. of stope preparation, 16,073 ft. of diamond drilling and 2097 ft. of guniting to replace drift timbering. Work continued in driving the 960 level extraction drift from the Junction to the S.E. Extension porphyry, pocket installation on the 1100 level and an ore pass up to the 960.

The Holbrook leach plant was closed down April 4 and used thereafter only during the rainy season and a four cell precipitation plant built on the Junction 1800 level. Pumping at the C & C shaft was discontinued February 20 and the 1800 level pumps and



1932 (Cont)

shaft column salvaged. Regular pumping from the Czar and Holbrook was discontinued April 4. At the Junction the 2200 level pump sump was doubled in capacity preliminary to the installation of one centrifugal and one duplex 2000 GPM pump. The Diesel Plant was placed on a standby basis beginning January 12.

Unusual expenditures were limited to \$18,099.65. A service hoist was installed on the Campbell 2200 level to handle spill; the Junction and Campbell shafts were equipped with telephones and a narrow gauge track constructed between the two shafts for handling supplies. Old buildings at the Briggs, Gardner, Holbrook, Irish Mag and Hoatson were razed in a cleanup program.

Employees working averaged 906, the number decreasing from 1053 to 801 with 74 hires and 326 terminations. Those in the mechanical department were reduced from 313 to 247 employees. Operations continued on a part time basis with 187 work days or an average of 15.6 days per month. Relief was extended to 597 families at an average of \$19.54 per month per family or \$4.49 per person. Nineteen pensions were granted during the year with 191 active at year's end and pension payments totaled \$121,320.10. The Employees Benefit Association experienced a deficit of \$20,759.15 with expenses of \$66,094.83 and a \$10,000 contribution from the Company. State Compensation of \$20,290 or 1.78% of the payroll was for 12 serious and 2 slight accidents at Bisbee. Taxes amounted to \$806,800.11 based on an average tax rate of \$3.1215 and \$25,846,268 valuation.

In addition to supervising the Safety Department, H. C. Henrie was made Manager of the Warren Company.

1933

Production from all sources totaled 330,734 tons containing 58,831,552 lbs. Cu. 1,348,704 oz. Ag., 30,680 oz. Au and 211,257 lbs. of lead. The two divisions mined 303,726 tons with an average grade of 9.23% Cu., 3.70 oz. Ag. and .079 oz. Au. with 219,336 tons of 10.21% ore from the Campbell and 84,390 tons of 6.70% limestone ores from the Junction. Lessees mined 18,985 tons of 3.15% siliceous ore from the Don Luis, Southwest and Czar and 1567 tons of 6.74% lead ore with 19.52 oz. Ag. The Underground precipitation plant made 559 tons of 48.93% precipitates and 5897 tons of 8.41% scrap and metals were salvaged from the Copper Queen smelter.

Production of metals returned from the smelter on Bisbee ores treated totaled 61,070,446 lbs. Cu. 1,302,926 oz. Ag. and 30,310 oz. Au. Based on 56,739,479 lbs. of salable copper produced, per pound costs for Bisbee copper averaged 4.95¢ including 2.43¢ F.O.B. Douglas, Smelting 0.85¢, freight, selling and refining 1.47¢, Eastern and Western Overhead 0.72¢, depreciation and Idle Property 0.83¢ and after a gold-silver credit of 1.85¢ with 7.55¢ average price for copper, operating profits were estimated at \$1,946,617.89 before depreciation and maintenance of idle property.

The average stoping efficiency increased from 7.61 tons per man shift during 1932 to 9.60 during the current year largely due to the use of slushers in stopes and decreased development and stope preparations.

Development footage included 23,832 ft. of headings, 4134 ft. for stope preparation and 6885 ft. of diamond drilling. Sinking of the Junction shaft was started and 110 ft. of advance cost \$51,071.74. The flow of water increased to 600 GPM. The 1600 and 1900 level stations were enlarged and a new one cut on the 2433 level. Concrete reinforcing pillars were poured on the 1200 and 1600 to stabilize the shaft.



1933 (Cont)

A pump station was also cut on the 2300 level with connecting raise to the 2200 and enlargement of the 2200 pump station and installation of a 2000 GPM centrifugal pump was completed. Guniting continued with 8721 ft. of drifts and 30,614 sq. ft. of stations and other openings. Development work was largely confined to the Junction 1600, 2000 and 2200 levels and in the Campbell to the 1800, 1900, 2000 and 2300 levels.

The Junction mine water flume after 25 years of service, was replaced with a double flume at a cost of \$11,897.88. The 12 inch salvaged pipe column from the Junction shaft was used from the end of the flume to the Warren pump house where one new pump and an old one from the C & C flume were installed for irrigation water and supplying water to the Diesel plant and cementation plant. A fire at the Higgins shaft on November 29 burned out the shaft timbers. The doctors' residence on the site of the old Copper Queen Hospital was sold and dismantled.

Unusual charges during 1933 included:

Sinking Junction shaft 110 ft.	\$ 51,071.74
Four air and 16 electric slushers	14,053.75
Six Einco loaders	11,833.64
Twelve rock drills	5,373.49
Four - 20 cell loco storage batteries	2,235.45
Junction 2200 station and pump column	9,886.68
New fence at Campbell shaft	<u>4,099.21</u>
Total	\$ 98,553.96

Employees increased from 801 to 809 at the end of the year with 124 hires and 116 terminations. The mines operated 215 days during 1933 or an average of 17.92 days per month. Relief work continued with \$262,766.63, including \$47,090.43 under the civil works program, given to 908 families or 4329 persons at the monthly rate of \$22.34 per family or \$5.06 per person. State Income Tax and Privilege Sales Tax became effective July 1, 1933, with the Sales Tax to expire March 1, 1935. With the National Recovery Act, an Employees Representation Plan was inaugurated. The Mine, Mill & Smelter Workers organized but no demands were made for representation. Mr. Davenport, in charge of the Supply Department retired from service.

1934

Production totaled 526,996 tons with 74,999,933 lbs. Cu., 2,384,697 oz. Ag., 47,892 oz. Au and 32,190 lbs. of Pb. as contained metals. Salable metals included 71,628,656 lbs. Cu., 2,279,032 oz. Ag and 47,643 oz. Au. Based on 71,628,656 salable pounds of copper produced, per lb. costs averaged 3.69¢, including 3.06¢ F.O.B, smelter, smelting and converting 1.10¢, freight, selling and refining 1.50¢, western and eastern overhead 0.73¢, taxes 0.88¢, depreciation 0.85¢ and a gold-Silver credit of 4.36¢. With an 8.68¢ selling price for copper, operating profits were estimated at \$3,574,852 exclusive of pensions and special allowances.

The Campbell division mined 326,861 tons of 8.62% ore, the Junction 115,656 tons at 5.71% and 2860 tons of 17.49% Cole ore was mined to augment recoverable gold and silver. Lessees produced 57,152 tons of 1.81% siliceous ores from the White Tailed Deer, Uncle Sam, Southwest, Czar and Holbrook and 43 tons of lead ore from the Campbell. Production from the S.E. Extension block cave was discontinued during the latter part of the year after producing 9381 tons of 2.95% porphyry. Scrap and smelter cleanup accounted for 14,606 tons and of 437 tons of 40.01% precipitates,



1934 (Cont)

110 tons came from the Holbrook launders and 327 tons from the Junction 1800 level cementation plant.

Stoping efficiency averaged 9.32 tons per man shift, with direct stoping costs of \$0.93 per ton. Stoping in the Campbell was extended to the 2000 and 2200 levels with a lower grade of copper but higher in precious metals. Repairs to the Cole shaft were started in May and production started at a low rate in July.

Development work included 26,106 ft. of headings, 5941 ft. of stope preparation and 10,418 ft. of diamond drilling. Footage per man shift averaged 2.42 ft. in drifts and 1.61 for raising. The Junction 2300 level was developed by 3553 ft. of headings and a drift started on the Campbell 1300 level toward a tentative shaft location on the Combination claim, 3300 ft. to the southwest. Development costs totaled \$302,051.88 during the year.

Repairs to the Cole shaft were started in May from the surface to the 1400 level and retimbered between the 900 and 1100 ft. levels. The Junction shaft was sunk to the 2710 and stations partially cut and concreted on the 2566 and 2700 levels at a cost of \$105,722.75. The main 8 inch airline was extended from the 2200 to the 2700 level. The flow of water when sinking averaged 650 GPM. Guniting of mine workings included 10,808 ft. of drifts and 9889 sq. ft. of stations.

Unusual items of expense charged to operating costs included:

Sinking Junction shaft & cutting stations	\$ 105,722.75
Thirteen stopers & 19 drifters	12,802.66
Three Elmco loaders	6,129.35
Four Sullivan slushers & two 7-1/2 h.p. air hoists	4,947.91
Batteries for haulage motors	4,262.36
Fourteen 38 cu. ft. car bodies & mine car wheels	2,167.76
Sixty 16 cu. ft. mine cars	8,207.40
One cast steel water door and frame	<u>1,235.48</u>
Total	\$ 145,475.67

Operating days totaled 257 or an average of 21.42 per month. Employees increased from 809 to 943 with 306 entrants and 172 terminations. Wages were increased 10% on April 26 with a corresponding adjustment in salaries. The Bisbee Miners Union was quite active and presented a number of demands which were not granted. The Employees Benefit Association's income was \$51,244.86 with \$55,136.82 paid out with increased sickness and unusual number of deaths.

One pension was granted during 1934 and with 13 deaths 176 pensions were in effect in December with pension payments amounting to \$116,207.38. Compensation payments to the Industrial Commission were \$34,838 for the mine and smelter. Bisbee experienced 2 fatalities, 19 serious and 3 slight injuries. With a valuation of \$16,005,264 and average levy of \$3.969, taxes amounted to \$635,199.29 for the mine and smelter.

There were no major staff changes during 1934 and Joseph Hodgson continued as Manager.



1935

Production totaled 578,342 tons containing 66,173,469 lbs. of copper, 2,659,295 oz. Ag. and 53,300 oz. Au. With 270 work days, the Campbell mined 314,307 tons of 7.33% copper ore, the Junction 133,682 tons of 4.66% ore and the Cole 34,531 tons with a grade of 7.17% copper. Lessees in the White Tailed Deer, Southwest, Holbrook and Briggs produced 85,467 tons of 0.86% siliceous ores. A minor amount of 115 tons came from the S.E. Extension, 9730 tons from smelter cleanup and scrap and 510 tons of precipitate, 7 tons of which was from the Holbrook plant.

Salable metals in ores mined and treated at Douglas amounted to 61,796,954 lbs. Cu., 2,539,490 oz. Ag and 52,766 oz. Au. Costs per lb. of 3.69¢ included 3.90¢ F.O.B. smelter, smelting 1.39¢, freight, selling and refining 1.35¢, eastern and western overhead 1.11¢, taxes 1.05¢, depreciation 1.15¢ and a 6.00¢ credit for gold and silver. Based on a selling price of 8.887¢ for copper, operating profits were estimated at \$3,213,835 exclusive of pensions and special allowances.

With 270 working days the Junction, Campbell and Cole averaged 495, 1164 and 128 tons per day. From the Junction 8720 tons of basic sulphide ore was sold as flux. Stopping efficiency averaged 9.95 tons per man shift and mining costs \$3.77 per ton. Tonnage from the Junction was from the 1600 to the 2200 levels, from the 1900 to the 2200 in the Campbell division and at the Cole, mining was on the 500, 800 and 1100 levels.

Development included 31,075 ft. of headings, 6231 ft. of stope preparation and 10,290 ft. of diamond drilling which cost \$20,670.80. Cross cutting on the 2300 level totaled 5047 ft. Excavating and concreting the Junction 2700 station was completed at a cost of \$44,747.34 and on the 2433 level the station was cut and a transfer raise run to the 2300 level. Draining the area east of the Campbell fault was begun and water in the Warren shaft was lowered 67 ft. No pumping was done at the Czar and pumping from the Junction station averaged 3750 GPM with a maximum of 4237 on October 26. On surface the Copper Queen machine shop was moved to the Junction yard at a cost of \$39,703.69 and a 3150 cu. ft. Nordberg compressor transferred from Morenci. The Diesel plant was operated 286 days.

Unusual expenditures during 1935 included:

Sinking Junction shaft and station work	\$ 44,747.34
20 stopers & 19 auto feed drifters	8,672.77
4 Finlay loaders	8,152.68
Mine cars from stock	5,471.60
Bulkhead doors and pump parts	4,530.98
Obsolete Materials	22,384.38
Move machine shop & other shop changes	39,703.69
Total	\$133,663.44

Employees increased from 943 to 1036 with 598 hires and 1036 terminations. Membership and interest in the Miners Union decreased materially and during a strike from June 10 to August 15, the plant was picketed, but lack of support resulted in the labor organizers leaving the District; however, the strike cost \$121,393.63 at the Copper Queen Branch. The Labor Benefit Association paid out \$101,865.37 and with \$62,402.76 income it was necessary for the Company to contribute \$20,000 as compared with \$10,000 during previous years.

H. M. Lavender, Mine Supt., transferred to the General Manager's office at Douglas on May 10; J. P. Hodgson resigned as Manager on August 1 and was replaced



1935 (Cont)

by J. H. Barkdoll; H. C. Henrie was appointed General Superintendent and S. W. Fisher promoted to General Foreman on August 1.

1936

Production totaled 795,946 tons containing 80,886,235 lbs. of copper 3,126,224 oz. Ag. and 63,465 oz. Au. The Junction mined 177,499 tons of 4.65% ore largely from above the 2300 ft. level; the Campbell 367,766 tons of 6.83% copper ore and 432 tons of lead-silver ore; the Cole 85,663 tons at 3.76%; the Sac division 16,745 tons of 4.80% ore and lessees 145,675 tons of 1.84% siliceous flux. Smelter cleanup and scrap totaled 1503 tons and of 663 tons of 40.5% precipitates 167 tons were from Don Luis and 496 tons of 42.28% precipitates from the Junction 1800 level cementation plant.

Salable metals from Copper Queen Branch ores shipped to Douglas were 75,437,059 lbs. Cu., 2,987,817 oz. Ag and 62,841 oz. Au. Per pound costs averaged 3.85¢ or 5.28¢ F.O.B. Douglas, smelting 1.26¢, freight, selling and refining 1.27¢, eastern and western overhead 0.72¢; taxes 0.65¢, depreciation 1.15¢ and a 5.97¢ credit for gold and silver. With an average selling price of 9.87¢, operating profits are estimated at \$4,538,476 exclusive of \$155,250.45 for pensions and special allowances.

Mining costs averaged \$4.61 per ton, stoping efficiency 8.76 tons per man shift, drifting 2.14 ft. and raising 1.53 ft. per man shift. The year was one of expansion with mining extended to new areas adjacent to the Lowell, Gardner and Sac shafts. Development on the 2300 level doubled the ore reserves near the Denn side line. The Junction, Campbell and Cole averaged 571, 118½ and 275 tons during 311 work days with the Sacramento averaging 161 tons for 104 work days.

Development included 50,429 ft. of headings, 10,420 ft. of stope preparation and 12,074 ft. of diamond drilling. Development in the Cole was for siliceous Ag-Au ores on the 500, 800 and 900 level and for copper ores from the 1000 to the 1300 level. The Sac and Gardner areas were reopened in August as Division E. Preparatory work at the Galena was started in April and sinking on July 17. The shaft was sunk 1104 ft. with a daily advance of 8.76 ft., \$75.56 per foot or \$103,527.53 spent during the year. At the Junction \$56,568.51 was spent for station work on the 2433 and 2566 levels and driving raises from the 2700 to the 2300 level. The Junction 1100 level pocket was also concreted at a cost of \$12,677.34.

The Sac dinky steam hoist was moved to the Dallas and converted to electric; the Cuprite headframe to the Galena shaft where a new hoist house and change room were constructed; and an air compressor from the Warren shaft was moved to the Czar for the use of lessees. Draining of the area east of the Campbell fault continued for exploratory purposes, a 2250GPM Prescott triplex pump was installed on the 2200 level, three centrifugal pumps on the 2700 ft. level, a new 14 in. pump column in the Junction shaft and a 300,000 C.M. power cable for the Junction 2200 level pumps.

Unusual expenditures during 1938 included:

Junction shaft - pockets and stations	\$ 56,568.51
Sinking Galena shaft 1104 feet	103,527.53
12 drifters, 12 Cochise pluggers, 24 wet stopers	13,579.11
5 Finlay loaders	10,089.84
12 Double drum slusher hoists	10,318.33
Batteries for locos & locos from Globe	7,529.55
Direct current power cables for Cole & Campbell shafts	3,489.51



1936 (Cont)

Concreting Junction 1100 level pocket	\$ 12,677.34
10 and 12 inch drainage lines & pump column	3,783.82
Renewal of No. 7 dump leaching equipment	<u>23,148.21</u>
Total	\$244,711.75

Employees increased from 1036 to 1526 with 880 hires and 390 terminations. Unskilled and semi-skilled labor was plentiful but miners and mechanics scarce. Wages and salaries were increased 5% on September 1 and December 1, with an average wage scale of \$5.20 for the year and \$5.55 during December. The Employees Association formed in 1934 continued as the dominant labor organization. Employees Benefit Association dues were increased from \$1.75 to \$2.00 and the Company increased its annual contribution from \$10,000 to \$15,000. During the year \$83,712.98 was paid in benefits with a deficit of \$12,177.71. Dr. Robert Fergus resigned as Chief Surgeon on June 1 and was replaced by Hal W. Rice from Morenci. J. W. Barkdoll continued as General Superintendent and P. G. Beckett as Vice President & General Manager.

1937

Production totaled 967,688 tons with gross metal contents of 105,422,876 lbs. Cu., 3,238,748 oz. Ag., 60,102 oz. Au and 333,560 lbs. of lead. Salable metals of 98,616,199 lbs. Cu., 3,133,118 oz. Ag. and 59,792 oz. Au. were from ores shipped to the Douglas smelter and exclusive of the returnable metals in lead ores shipped to El Paso. Costs per lb. of copper averaged 5.90¢ after a gold-silver credit of 4.57¢. The E & MJ price for copper averaged 13.167¢.

With 308 work days, the Campbell mined 367,151 tons of 6.49% ore at a daily rate of 1193 tons; the Junction 200,244 tons of 5.26% ore at 650 tons per day, the Cole 113,142 tons with a grade of 4.65% and 367 ton rate and the Sac 88,418 tons of 5.14% sulphide ore at a daily rate of 287 tons. Production by lessees included 156,794 tons of 3.45% siliceous ores and 439 tons of lead ore with the Company mining 200 additional tons from the Campbell. In the S.E. Extension 37,390 tons of 2.61% porphyry was shipped for smelter flux and 323 tons of scrap and cleanup was salvaged from the Copper Queen smelter.

Leaching of surface dumps was resumed and 3072 tons of 57.52% precipitates was shipped from Don Luis and 515 tons with a grade of 53.47% from the Junction plant.

In the Campbell division considerable tonnage came from pillar mining and at the Sac, top slicing was changed to square sets. The S.E. Extension was prepared for mining from the 1000 to the 1300 ft. levels with a connection to the Junction on the 1600 ft. level. One unit of the concentrator was remodeled, the railroad repaired and surface plant put in shape. After spending \$526,304.55 and bringing the porphyry area into production the concentrator was not used. Stopping costs averaged \$5.31 per ton and stopping efficiency 8.39 tons per man shift. The program of expansion continued until September when operations were curtailed because of economic conditions.

Development totaled 65,238 ft. of headings including 303 ft. of shafts, 13,700 ft. of stope preparation and 14,658 ft. of diamond drilling. At the Galena development work was done on the 600, 800, 1000 and a connection made to the Campbell on the 1300 level. After spending \$237,270.57 work was stopped in October. At the Junction \$22,936.05 was expended in completing the lower level stations and pockets and hoisting from the 2566 started in March. The Gardner shaft was repaired down to the 1400 level and a drain line installed; the Saginaw shaft collar was concreted and at the Sac, the skip and dinky compartments were put in operating condition. Drain holes were drilled from the 1800 to the flooded Warren shaft; a drain line to the



1937 (Cont)

Campbell shaft was started on the 2200 level and three 1500 GPM centrifugal pumps installed on the 2700 level, at a cost of \$10,611.24. Power cables for the Junction 2200 and 2700 level pumps cost \$23,633.18. Pumping averaged 5,342 GPM with a maximum of 5891 in May. Since August 1935 the water level in the Warren shaft was lowered 411 ft. and 362 ft. in the C & C shaft.

On surface, three 3000 KVA transformers and two voltage regulators were installed in the Junction power plant, three 750 KVA transformers moved to the Diesel Plant at a total cost of \$51,934.56. Two 7200 cu. ft. diesel compressors from Moctezuma were converted to electric drive at a cost of \$118,210.26. Hospital capacity was increased from 16 to 28 rooms or from 33 to 45 beds, the added wings costing \$26,857.69 and the second and third floors at the Copper Queen Hotel were remodeled. The 1800 precipitation plant was enlarged, the 1500 level unit shut down and production from the Don Luis plant was from the concentrator dumps and the dump near the Campbell shaft. The buildings and equipment in the small lead concentrator were dismantled and transferred to Minera de San Carlos and the central power plant boilers were placed in operation to supply steam to the Sacramento shaft hoist. Miscellaneous earnings of \$282,515.46 included a profit of \$159,238.51 on the sale of sulphuric acid.

Appropriation expenditures during 1937 were:

Three Aerovane ventilation fans & power cables	\$ 4,528.26
Power cable for Junction shaft	23,633.18
Transformers-Junction sub station	28,410.93
Voltage regulators-Junction sub station	13,691.82
3 centrifugal pumps-Junction 2700 level	10,611.24
Addition to Copper Queen Hospital	26,857.69
2 compressors from Nacozari for J.P.P.	<u>118,210.26</u>
Total	\$225,943.38

Charges to Operating Accounts:

Renewal of No. 7 dump leaching equipment	1,896.97
Additional transformer capacity Diesel Plant	9,831.81
Copper Queen Hospital repairs	<u>4,926.12</u>
Total	\$ 16,654.90

The number of employees increased from 1526 to 2061 in September and down to 1417 in December with 1176 hires and 1285 terminations. Wages were increased four times or 18% by May 1 and were back to the original figure on 1-1-38. Wages averaged \$5.98 as compared with \$5.20 during 1936. Industrial Commission charges of \$90,810 were for the smelter and mine which experienced 48 serious and 17 slight injuries from accidents. With 93.4% membership of Bisbee employees in the Employees Benefit Association, contributions of \$15,000 from the Company and \$76,546.06 from mine and smelter employees; \$105,094.99 was paid out for accident and sickness benefits. No pensions were granted during 1937 and with 5 deaths, pensioners totaled 152 at the end of the year and were paid \$102,565.62. For tax purposes the valuation of the mine and smelter was set at \$18,490,840 and with a levy of \$1.49 for State, County and School districts, taxes amounted to \$276,050.63. Social Security, unemployment, State Sales tax, electric energy and luxury taxes totaled \$275,104.15.

Le Roy Walton was made General Mine Foreman of the Sacramento and S.E. Extension



1937 (Cont)

in June. I. H. Barkdoll, General Superintendent, died on December 1 in Chicago and was replaced by H. C. Henrie. H. M. Lavender was General Manager and P. C. Beckett continued as Vice President with offices at Douglas.

1938

Production at the Copper Queen Branch totaled 848,491 tons with gross metal contents of 92,461,832 lbs. Cu., 2,449,084 oz. Ag., 49,857 oz. Au and 28,994 lbs. of lead. Salable metals for ores shipped to Douglas were 86,482,647 lbs. Cu., 2,365,547 oz. Ag. and 49,641 oz. Au. Costs per lb. of salable copper averaged 4.90¢ after a gold-silver credit of 3.76¢.

In 309 work days the Junction mined 168,871 tons of 5.08% ore at a daily rate of 547 tons; the Campbell 284,166 tons of 6.45% at a rate of 919 tons; the Cole 78,373 tons of 6.94% ore at a rate of 254 tons and the Sac division 104,558 tons with an average grade of 5.68% Cu. at a daily rate of 338 tons. In the S.E. Extension, 173,184 tons of 2.62% flux ore was mined; lessees shipped 36,944 tons of 6.85% copper ores, scrap cleanup totaled 953 tons and of 1348 tons of 56.35% precipitate 568 tons came from the Don Luis plant and 780 tons from the mine. Production of lead ore was limited to 94 tons and mining of siliceous ores by lessees decreased appreciably because of porphyry flux from the S.E. Extension division.

Mining costs averaged \$4.32 per ton and stoping efficiency 10.41 tons per man shift. In the Cole division three beds of good ore were opened up on the 600 level and the Campbell main ore body was extended somewhat below the 2000 level.

Development footage totaled 47,446 ft., stope preparation 11,331 ft. and 11,821 ft. of diamond drilling. Development in the Alhambra claim on the 900 level was encouraging and a connection was made to the Dallas shaft on the Cole 1200 ft. level. Development work was resumed at the Galena on the 600 ft. level and in the Sac division development on the 1100 level was encouraging near the Lowell shaft and in the Virginia claim on the 1400 ft. level. Pumping averaged 5,966 GPM with a high of 6627 GPM on August 20. Water in the Warren shaft was lowered 220 ft. and 148 ft. in the C & C shaft.

Reduction in mining costs was partially due to decreased plant and equipment expenditures. Electric cap lamps were installed in February for the Junction and Campbell divisions at a cost of \$6,711.67. Installation of the two compressors in the Junction Power House was completed with expenditures of \$2,164.72, surface air lines cost \$8,021.94; slusher hoists \$7,026.83 and \$4,497.78 was spent for rock drills. The Phelps Dodge Mercantile store, valued at \$92,126.66 burned on September 23.

The number of employees decreased from 1417 to 1343 with 357 hires and 431 terminations. Wages averaged \$5.75 with one 10% reduction in July. The Federal Wage & Hour Law became effective October 24, 1938 and a wage agreement was made with the employees for a sliding scale based on copper prices. With 4 deaths, pensioners totaled 148 at year's end with pension payments of \$98,284.77. The Company's contribution to the Employees Benefit Association was increased from \$15,000 to \$18,000 and \$54,785.16 paid out for sickness and accident benefits at the mine and smelter. Industrial insurance of \$63,998 by the Industrial Commission was for both the smelter and mine, which experienced one fatality, 30 serious and 5 slight injuries. Taxes for the mine and smelter totaled \$636,165.08 including \$422,077.85 for real and property taxes.



1938 (Cont)

George Lyman, with service at the Copper Queen Branch from 1915 to 1936 was recalled from the United Verde in February 1938 as Mine Superintendent and served in this capacity until his death on December 7, 1938. The annual report was by H. C. Henrie, General Superintendent and addressed to H. M. Lavender, General Manager.

1939

Production from all sources totaled 907,669 tons with gross metal contents of 101,251,659 lbs. Cu., 2,396,088 oz. Ag., 50,519 oz. Au., 254,225 lbs. Zn. and 16,345 lbs. of lead. Salable metals from ores shipped to Douglas were 95,105,086 lbs. Cu., 2,302,886 oz. Ag. and 50,282 oz. Au. Costs per pound of copper averaged 5.71¢ after a 3.48¢ gold-silver credit and 0.42¢ for toll ores, sales of ore and miscellaneous earnings. The E & MJ price for copper-domestic refinery averaged 10.965¢.

Mining was on a six day per week basis with 308 work days. The Junction mined 208,124 tons of 5.39% ore at a daily rate of 676 tons; the Campbell 278,972 tons with a grade of 7.20% at 906 tons per day; the Cole 105,407 tons of 5.74% ore at a 342 ton rate and the Sac division 105,738 tons at 5.12% and 343 tons per day. For smelter flux 164,673 tons of 2.59% porphyry came from the S.E. Extension. Lessees mined 42,392 tons of 6.38% copper ore; 892 tons of lead ores which were shipped to El Paso and 39 tons of Pb-Zn ore which were treated by the Ozark Smelting & Mining Co. at Coffeyville, Kansas. Scrap cleanup was limited to 8 tons and of 1424 tons of precipitates, the Don Luis plant made 861 tons with a grade of 68.45% Cu. and 563 tons of 54.05% precipitates came from the underground plant. Mining costs averaged \$4.78 per ton, stoping efficiency 9.68 tons and 2.15 tons per man shift underground.

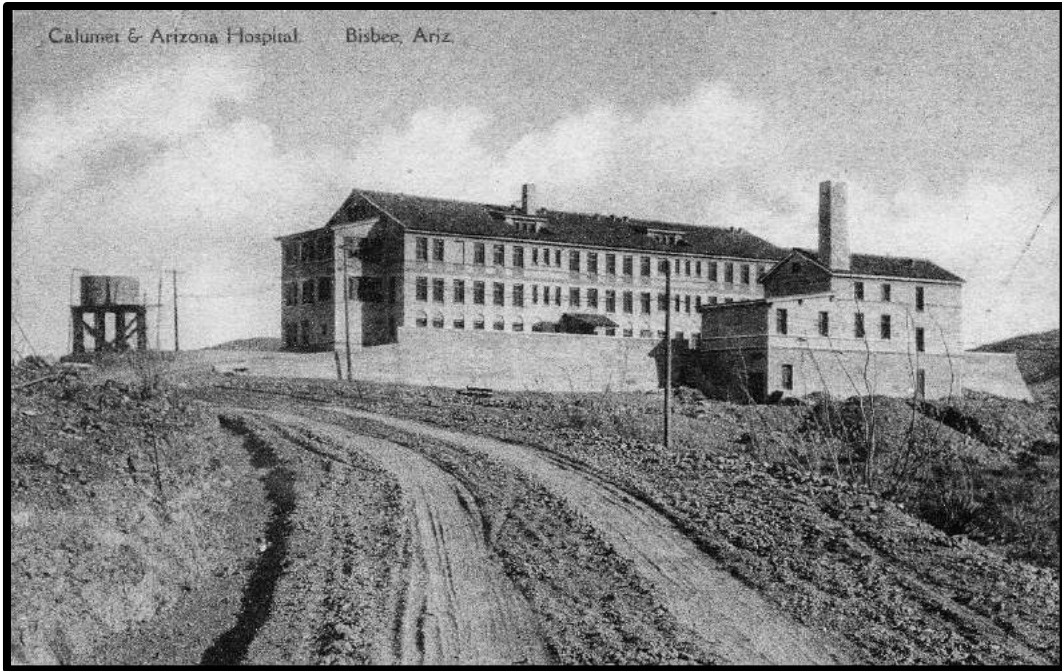
Development footage amounted to 53,242 ft., stope preparation 11,064 ft. and 17,273 ft. of diamond drilling. At the Galena shaft 5338 ft. of drifting cost \$89,100.71. Retimbering of 1080 ft. of the Saginaw shaft and guniting the shaft walls cost \$19,893.86; the Campbell shaft was sunk and concreted from the 2360 to the 2750 elevation, a distance of 381 ft. at a cost of \$68,502.39; and at the Junction, the 1800 level station timber was replaced with steel. Changing to skip hoisting at the Cole was started at the end of the year. Amogel powder was adapted as a standard explosive, drill steel changed from 1 inch to 1-1/8 inch; test work done on detachable bits; the Cole 1200 level equipped for electric haulage and half of the shaft timber replaced with treated timber.

Draining the area east of the Campbell fault continued. Pumping averaged 6658 GFM with a maximum of 7323 GFM on August 10. The Junction precipitation plant was repaired and remodeled and the Don Luis plant put back in operation during the middle of the year.

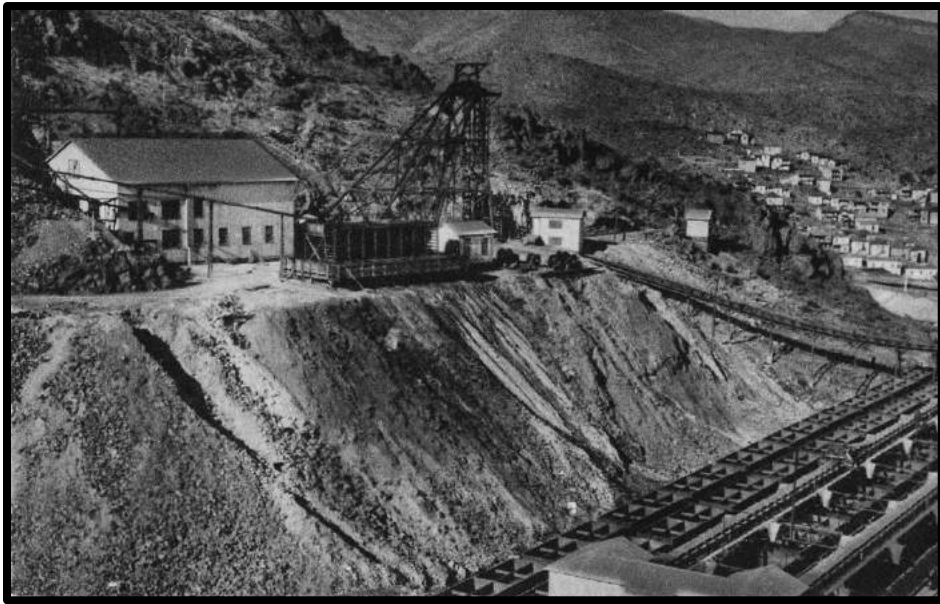
During 1939, \$249,705.97 was expended for plant and \$170,392.43 charged to operations or a total of \$420,098.40

<u>App. No.</u>	<u>Description</u>	<u>Appropriations</u>	<u>Operation</u>
277	Relocation of S.P. Tracks		10,561.16
278	Construct new saw mill	25,214.15	
279	Electrify Sac Hoist		51,606.03
280	Alteration Junction head frame (remove crusher, ppt. bin & loading arrangement)		18,299.10
281	Booster pumps Campbell 2200 level	15,003.16	
282	Porphyry conveyor loading system		12,008.16
283	Two 1500 GFM pumps Junction 2700 level	10,969.44	





Soon after the merger between Phelps Dodge and the Calumet & Arizona Mining Companies the Calumet and Arizona Hospital was closed (p.68, para. 3)



The Sacramento Mine closed on January 12, 1932 (see p.68, para. 6)





The abandoned Galena Shaft. This was an exploration shaft started by the Calumet & Arizona Mining company and was later taken over by Phelps Dodge. (see p. 69, para. 2 & p. 77, para. 4)



A Western Electric Mine phone originally installed in the Campbell Mine (see p.76, para. 5)





An Ingersoll –Rand stoper with shortened leg (see p73, para. 7)

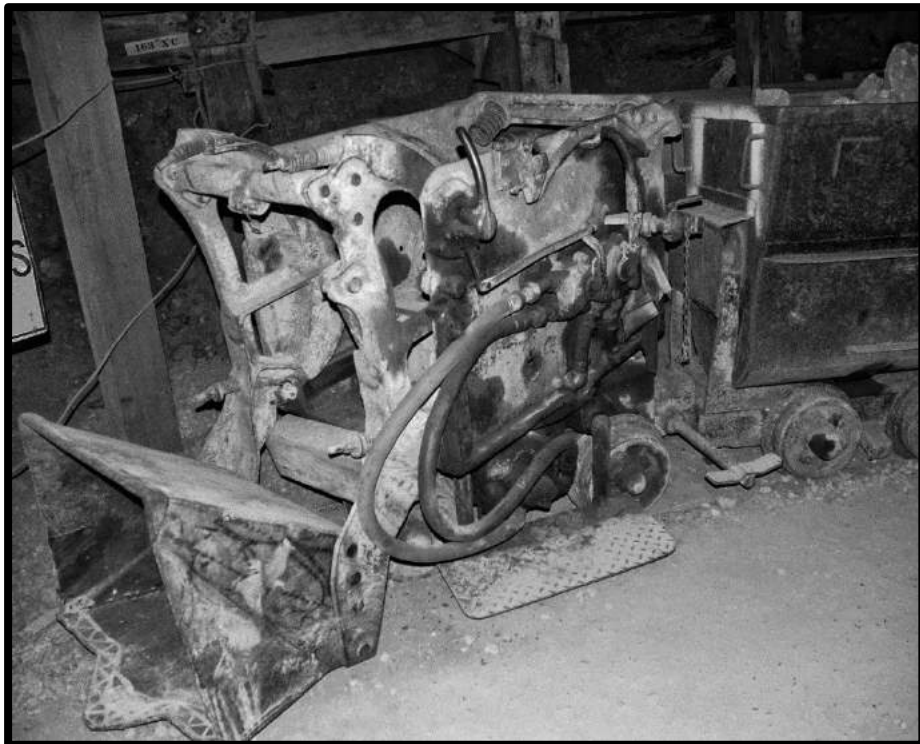


A Cochise brand of plugger drill resting on a timber truck (see p.73, para. 7)





A miner loading a mine car with EIMCO mucking machine in the Campbell Mine
(see p.73, para.7)



An EIMCO mucking machine (Finlay) on the 3rd level station of the Southwest Mine(see p.73, para. 7)





A Model K Edison Cap lamp, the first style used in Bisbee mines (see p.76, para. 5)

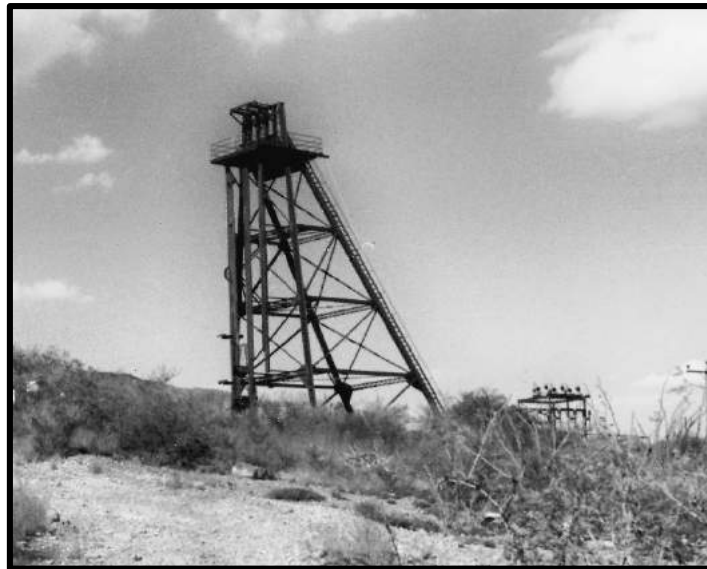


A miner with a model K Edison Lamp drilling in the Campbell Mine. (see p.76, para. 5)





A box for AMOGEL a type of ammonium dynamite (see p.77, para. 4)



The abandoned Saginaw Shaft. (see p. 77, para 4)



1939 (Cont)

App. No.	Description	Appropriations	Operation
284	Sink & concrete Campbell shaft 381 ft.		\$ 68,502.39
285	Repairs Bisbee store warehouse		9,415.69
286	New Mercantile store (Del Webb)	\$ 167,876.21	
287	Cole skip installation	113.60	
288	Two Campbell 2700 level centrifugal pumps, column and power cables	30,529.21	
	Total	\$249,705.77	\$170,392.53

The labor force was increased from 1343 to 1662 with 649 hires and 330 terminations. A 5% increase in pay was effective in October and wage rates averaged \$5.80 per shift. Regular meetings continued to be held with the Employees Association committee. W. P. Crawford was made Mine Superintendent on January 1, 1939.

1940

Production from all sources totaled 1,010,819 tons with gross metal contents of 103,429,050 lbs. Cu., 2,150,153 oz. Ag., 53,560 oz. Au. and 104,776 lbs. of lead. Salable metals totaled 96,418,767 lbs. of Cu., 2,060,605 oz. Ag. and 53,212 oz. Au., of which 5,721,510 lbs. Cu., 152,407 oz. Ag. and 3,251 oz. Au were from 46,994 tons of 6.957% Junction and Campbell ores treated at the Clarkdale smelter. Costs per lb. of copper averaged 5.99¢ after a 3.44¢ Au-Ag credit and 0.42¢ for toll ores, sales of sulphuric acid and other miscellaneous credits. Shipments to Clarkdale started in November and with freight rates the per pound costs exceeded the Douglas costs by 2.05¢.

With 310 work days the Junction mined 282,510 tons of 5.02% ore at a daily rate of 911 tons; the Campbell 285,344 tons with a grade of 6.69% at 920 tons daily; the Cole 117,237 tons of 5.65% ore at 378 tons per day and the Sac 119,835 tons of 4.67% copper ore at a daily rate of 387 tons. In the S.E. Extension 187,539 tons of 2.08% porphyry flux was mined at a cost of \$1.35 per ton. Lessees mined 15,890 tons of 6.36% copper ore, and 491 tons of lead ore. The underground precipitation plant shipped 625 tons and the Don Luis produced 1299 tons from continuous leaching of No. 7 dump and intermittent operation of No.s 1 & 2 dumps. Scrap shipments were limited to 49 tons.

Mining costs averaged \$4.71 per ton, stoping efficiency 8.64 tons and 2.03 tons per man shift underground. The S.E. Extension was operated throughout the year to supply the smelter with siliceous ore. The muck from the caving blocks was slushed to the chutes below the sub level scum with discontinuation of the use of branch raises. A new 12-233 block above the 1200 level is being prepared for production with a grizzly level and no sub level above. With the increased depth and horizontal workings in the Campbell and Junction division higher temperatures required two large ventilation fans and improved ventilation outlets. The Cole shaft was changed to downcast, two fans installed on the 1200 and 1400 levels and connections made to the Dallas shaft as an upcast. More attention was paid to dust conditions, systematic sampling carried on, standard codes adopted and sprays used for slushing and haulage. Dust conditions in the block cave draw points required the use of respirators.

Development footage totaled 56,717 ft., 8929 ft. of stope preparation and 19,427 ft. of diamond drilling. Work was discontinued from the Galena shaft in September after driving 1307 ft. on the 600 and 1300 levels and 6548 ft. of diamond drilling. Development east of the Campbell fault was encouraging, also in the Cole-Dallas fault



1940 (Cont)

zone on the 1200 ft. level. Work continued near the Denn side line above the 2566 level and in the White Tailed Deer on the 400 and 800 ft. levels.

The Cole shaft was sunk 70 ft., a portion retimbered, loading pockets cut on the 1000 and 1400 ft. levels and the Interior shaft completed and placed in operation. At the Campbell, the 2433 and 2566 shaft stations and the 2700 pump station were completed. Extensive repairs were necessary in the Junction 2566 loading pocket, transfer raises and to the Dallas head frame. The Warren shaft was retimbered from the collar down to the 900 level.

Continued drainage east of the Campbell fault lowered the pressure to indicate the water table as 99 ft. above the 2200 level. Pumping averaged 6379 GPM with a maximum of 6994 GPM on February 29. Two 2000 GPM pumps were installed in the Campbell 2700 level pump station, a 14 in. column hung in the shaft and a 14 in. drain line laid from the Junction to the Campbell shafts. Obsolete buildings at the Holbrook, Gardner, Dallas, Sac round house and old Copper Queen shops were dismantled; the central power plant dismantled and sold and the Junction yard fenced.

The construction and modernization was practically completed and of appropriations \$223,308.09 was charged to capital and \$39,675.31 to operations.

W. O.	Job	Expenditures	
		1940	Total Cost
278	Central Saw Mill	\$ 8,535.28	\$33,749.43
286	P. D. Mercantile Store	21,331.28	189,207.49
287	Cole skip Installation	29,191.29	29,304.89
288	Campbell 2700 level pumps (sump, column & power lines)	158,218.67	188,747.88
290	New X-Ray equipment	6,031.57	6,031.57
	Total to Plant Account	\$223,308.09	\$447,041.26
289	Cole Shaft sinking & pockets	39,675.31	
	Cole Loading system	10,098.73	
	Rock Drills	4,824.21	
	Finlay Loaders	1,812.94	
	Build 100 - 19 Cu. Ft. cars	15,403.37	
	Build 25 - 33 Cu. Ft. cars	?	
	Alterations Copper Queen Hotel	6,231.82	
	Charged to Operating Accounts	\$ 78,046.38	

Labor forces increased from 1662 to 1751 with 725 hires, 636 terminations and a 2.6% turnover. Wages averaged \$5.87 per shift. Vacation allowances were paid for the first time and cost 6.0¢ per shift. Wages increased 5.0% in March with a similar decrease in October. Overtime payments amounted to \$133,449.04 on a basis of 42 hours per week to October 22 and 40 hours after that date. The Employees Benefit Association, with 93.4% of the mine employees as members had an income of \$100,680.68, expenditures of \$57,785.15 and a year end surplus of \$104,569.56. The Selective Service Act resulted in the loss of a large number of young employees. At Bisbee one pension was granted, 10 pensioners died, leaving 129 at year's end with payments of \$85,405.17. Payments to the Industrial Commission were \$52,313 or 1.211% of the payroll costs, with one fatality, 30 serious and 9 slight injuries at Bisbee. Taxes totaled \$708,267.42 including \$424,880.42 for property taxes on a valuation of \$19,629,108 for the mine and smelter. There were no major changes in administrative personnel during 1940.



1941

Production totaled 1,081,824 tons with gross metal contents of 109,002,810 lbs. Cu., 2,369,170 oz. Ag., 52,813 oz. Au and 4262 lbs. of lead. Salable metals, exclusive of the 28 tons of lead ore shipped to A S & R at El Paso, were 101,372,750 lbs. Cu., 2,255,617 oz. Ag. and 51,933 oz. Au. inclusive of 58,515,852 lbs. Cu., 1,109,803 oz. Ag and 30,173 oz. Au. recovered from 354,206 tons of 6.40% copper ores shipped to Clarkdale for smelting. Per pound costs averaged 7.70¢ after a 3.37¢ Au-Ag credit and 0.49¢ for the sale of acid and other miscellaneous earnings. With freight charges of \$3 per ton copper costs at Clarkdale exceeded those at the Douglas smelter by 1.65¢.

Stopping efficiency in the limestone divisions average 8.33 tons per man shift and 2.00 tons for all employees underground. Mining costs were \$5.20 for limestone ores and \$1.30 per ton in the porphyry division. With 319 work days, 302,008 tons of 5.21% limestone ores were mined from the Junction at a daily rate of 947 tons; 291,918 tons at 6.51% copper from the Campbell at a daily rate of 915 tons; 147,673 tons of 5.84% Cole ore at a 463 ton per day rate and 94,649 tons of 4.72% ore from the Sac at a daily rate of 297 tons. For smelter flux, 214,075 tons of porophyry averaging 2.06% Cu. was mined in the S.E. Extension by top slice and block cave methods. Eight active lessees produced 30,646 tons of 6.15% copper ore and 28 tons of lead ore. Under a new lease at the Czar, R. Mayne mined 2574 tons of 7.68% copper ore. Total tonnage included 562 tons of precipitate from underground, 245 tons from the Don Luis plant and 20 tons of scrap.

Development included 55,712 ft. for development, 9526 ft. of stope preparation and 15,824 ft. of diamond drilling. Work that was started in the Briggs area in 1939 was continued by the Campbell division and a small body of high grade oxide found in the 1400 level 662 crosscut. New ore was also developed on the 500 and 600 levels of the White Tailed Deer and from the 1100 to the 1300 level in the Cole-Dallas fault zone.

The Campbell 2700 level station was excavated to full size, steel sets installed 110 ft. of concrete slab poured in the bottom of 9 crosscut, and the broken curtain wall above this level was renewed with reinforced concrete. At the Cole, the 500 Interior shaft station was excavated and timbered. The use of two drill jumbos was established in crosscuts, Timken detachable bits adopted and the Rutherford Electronic shaft signals tried in shaft repairs.

On August 30, water encountered in the 2700 level 12 crosscuts flooded the pumps and rose to 123 ft. above the Campbell 2566 station. Deep well pumps were borrowed from Morenci and by year's end pumping was resumed from the 2700 level. During the year the water in the Warren shaft was lowered from 4 ft. above the 1800 level to 9 ft. above the 2000 level. Costs attributed to the flood amounted to \$103,119.64. Pumping averaged 6427 GPM with a peak of 9294 on September 29.

Unusual charges to operating accounts included:

Campbell 2700 level station	\$ 4,845.22
Junction steel sets in 960 shaft station	1,833.19
Interior shaft 700 level shaft station	1,202.09
New rock drills	51,578.72
Finlay loaders	5,228.20
Slushers and scrapers	20,390.74
Transformers and power cables	5,595.47
Building of 100 mine cars	16,043.71
Locomotive storage batteries	6,289.01



1941 (Cont)

Repairs to Idle shafts	\$ 17,465.29
Conveyor loading equipment	3,666.63
Water doors and installation	13,859.67
Expense for flood August 30	<u>103,119.64</u>
Total	\$251,117.58

Charges to appropriations were as follows:

<u>App. No.</u>	<u>Item</u>	<u>Amount</u>
291	Detachable Bit equipment	\$ 19,352.34
292	3 Byron Jackson Deep Well Pumps	47,215.40
293	Campbell 2700 level Booster Pumps	<u>4,104.42</u>
	Total	\$ 70,672.16

Employees averaged 1704 with a decrease from 1751 to 1626 at year's end. Wages increased from \$5.99 to \$7.26 with an average of \$6.64 for day's pay employees. Increases included 25¢ on March 23, 50¢ on September 1 and 25¢ on November 7. Vacation allowances amounted to 7¢ per shift and during the latter part of the year 9 weeks were on a 56 hour per week work schedule. On April 28 the U. S. Supreme Court ruled that certain former employees of the Company who left during 1935, should be reinstated and paid for loss in wages. Of 106 former employees 56 accepted and were reinstated and a reserve of \$150,000 was set up for reimbursement costs. An employee identification system with finger printing was started during the latter part of 1941 and also payment of one month's wages to inductees. A retirement plan for salaried employees was inaugurated on September 1. Following the reinstatement of former employees, the A. F. of L. and C. I. O. started an intensive organizing campaign, the Company recognized the A. F. of L. Metal Trades Council as the bargaining agent on July 23 and the Employees Association was disbanded on July 18. Douglas Shaw was appointed Assistant Mine Superintendent on January 1 and two shift bosses and three shop foremen were retired at the end of 1941.

1942

Production from the Copper Queen Branch totaled 1,087,715 tons with gross metal contents of 104,541,229 lbs. of Cu., 2,232,355 oz. Ag., 52,772 oz. Au., 35,154 lbs. Pb and 68,941 lbs. of lead. Salable metals exclusive of the 466 tons of lead ore from the Junction sulphide dump shipped to El Paso, 25,730 tons mined for Metal Reserve, and 194 tons of Pb-Zn milled by Shattuck Denn, were 96,436,638 lbs. Cu., 2,148,290 oz. Ag. and 52,937 oz. Au. inclusive of 7,556,638 lbs. Cu., 246,203 oz. Ag. and 4565 oz. Au. recovered from 62,351 tons of 6.40% ores from the Campbell and Junction smelted at Clarkdale. Costs per pound of copper averaged 8.10¢ after a gold-silver credit of 3.47¢ and 0.57¢ for toll ores and miscellaneous earnings. The variation in costs were 8.46¢ for copper from the Clarkdale smelter and 8.06¢ for copper processed at Douglas. The selling price averaged 11.775¢ during 1942.

With 340 work days the Junction mined 303,966 tons of 5.38% at a daily rate of 894 tons; the Campbell 284,015 tons at 5.79% or 835 tons per day and the Cole 182,254 tons of 6.04% ore at a daily rate of 536 tons. The Sac division worked 284 days and mined 55,752 tons of 4.59% ore at a daily rate of 196 tons. Siliceous flux amounting to 237,650 tons at 1.61% was supplied from the porphyry S.E. Extension at a cost of \$1.68 per ton. The precipitation plants shipped 492 tons of precipitates from underground and 526 tons from the Don Luis plant. Mining of lead-zinc was limited to 194 tons sold to Denn and 466 tons of flux from the Junction Dump shipped to A S & R.



1942 (Cont)

Stoping efficiency in the limestone areas averaged 7.36 tons per man shift and stoping costs \$5.99 including \$3.92 for labor. Mining was discontinued in the Sac division in October because of high costs and exhaustion of higher grade ore. With added depth both the Campbell and Junction were divided vertically into two divisions with a foreman in charge of each. The change over from conventional steel to detachable bits was completed in February.

Eight leases were active at the beginning of the year and three were cancelled in the Uncle Sam, Czar and Czar-Holbrook areas. Production was limited to 22,395 tons of 6.69% copper ore. A lease was granted in December to mine manganese ore from the Higgins.

Development included 51,451 ft. of headings, stope preparation 8549 ft. and 17,398 ft. of diamond drilling. Exclusive of the above figures, 3084 ft. of crosscuts were driven in the Porphyry division. The hoist from the Briggs and compressor was installed at the Cuprite, a station cut on the B or 400 level and 1198 ft. of drifting was done on contract. Prospecting on the 300, 400 and 600 levels of the Czar-Holbrook included 1829 ft. of headings. A drift was started from the Sac 600 level shaft station with an advance of 1409 ft. to explore the Sunrise claim along the Dividend fault. The hoist at the Silver Bear shaft was moved and installed at the Briggs.

With the shortage of copper and cooperation with the Federal Government, a contract between the Metal Reserves and Phelps Dodge was effected to mine marginal ores for smelting at Clarkdale. The reopening and rehabilitating of Junction low grade ores between the 1500 and 2000 levels was begun in November, also in the Cole 1100 level Tuscarora area; Sacramento 1000 to 1700 levels; Czar-Holbrook 300 to 600 levels and on the 6th and 7th levels of the Southwest. Footage driven for the account of Metal Reserves was limited to 383 ft. of headings and 440 ft. of diamond drilling. Shipments from the Junction, Sacramento and Czar-Holbrook low grade areas amounted to 25,730 tons of 3.32% Cu. ore with salable metals of 1,535,804 lbs. Cu., 15,733 oz. Ag., and 823 oz. Au., which are in addition to the production figures from regular mining operations.

Water was encountered on the 2200 level on the Rabbit claim 3000 ft. east of the Campbell fault. The flow in the 2700 level 12 crosscut decreased from 5000 to 3850 GPM. On this same level the 190 crosscut was advanced to within 48 ft. of 2203 crosscut from the Warren shaft and in addition to diamond drill drain holes, the Junction drain line was extended by 1500 ft. of 12 in. pipe. The water level in the Warren shaft was 32.5 ft. above the 2200 level station. Pumping averaged 6624 GPM with a high of 10,485 GPM on January 19.

A housing project for furloughed soldiers was started to include 59 buildings and 200 trailers. The YMCA was requested to vacate for dormitory purposes and the unused portion of the Warren office building was also used for housing. These facilities permitted dismantling of the former tent camp. The Gardner change room was razed and additions made to the Campbell and Cole change rooms. The Sacramento concentrator was partially dismantled and equipment sold or transferred to other Branches. At Douglas dismantling of the Copper Queen smelter continued with expenditures of \$36,524 and \$183,131.39 on a new stack for the roasters and reverbs.



1942 (Cont)

Appropriations at Bisbee during 1942 were limited to:

<u>App. No.</u>	<u>Description</u>	<u>Expended</u>
294	New gunite plant	\$ 16,167.52
295	Power cable for Junction shaft	<u>13,918.82</u>
	Total	\$ 30,085.80

Unusual charges to operating accounts included:

Rock Drills	32,639.12
Mechanical Loaders	12,629.10
Slusher Motors, scrapers & hoists	8,777.00
Drill carriages	4,595.53
Locomotive storage batteries	9,855.80
Repairs to idle shafts	12,337.34
Water doors and fittings	10,044.19
Ventilating fans	3,551.82
Installation Cuprite Hoist and headframe	15,250.86
Expense due to 1941 flood	49,697.86
Travel time for furloughed soldiers	<u>12,466.06</u>
Total	\$171,844.68

One increase of 50¢ in wages was effective April 16 making a minimum wage of \$4.90 or average of \$6.93 including 81¢ for overtime. Operations were handicapped by labor unrest and organizing by A. F. of L. and C.I.O. and a high labor turnover of 6.0%. In a runoff election on August 6 the A.F.of L. won representation in the mine as well as previous recognition in the shops. Total employment increased from 1626 to 2003 with an average of 1672 during 1942, with 1722 entrants and 1345 terminations. The Armed Services took 133 men with allowances paid to 87. Furloughed soldiers totaled 436 with 351 on the payroll at year's end.

The Phelps Dodge retirement plan was adapted September 1st for salaried employees and in December, 217 were enrolled from the mines division and the Warren Company. Day's pay pensioners decreased from 127 to 123 with \$81,045.45 being paid for pensions. The Employees Benefit Association continued to function with payments of \$64,910.58 including \$34,495.25 for 24 death claims. Membership in this organization was cancelled for employees who entered the armed services. A Labor Management War Production Committee was organized and a Plant Transportation Committee to aid in obtaining supplemental gasoline and tires.

Industrial Commission charges amounted to \$94,073 for the smelter and mine, which experienced 2 fatalities, 55 serious and 25 slight injuries. With an assessed valuation of \$17,731,665 for the mine and smelter, property taxes totaled \$350,531.95 with levies of \$1.26 for the State, County \$0.19, Bisbee Schools \$0.41, Douglas Schools \$0.63, City of Bisbee \$2.45 and \$1.79 for the City of Douglas.

There were no major changes in administrative personnel during 1942.

1943

Production from all sources totaled 1,135,664 tons containing 103,045,553 lbs. Cu., 2,120,470 oz. Ag., 53,341 oz. Au., 1,280,632 lbs. Pb., 2,108,249 lbs. Zinc and 797,671 lbs. of manganese. Shipments to the Douglas smelter totaled 861,111 tons and included 603,853 tons of limestone ores mined by the Company (122,998 tons of 5.90%



1943 (Cont)

ore from the Campbell and Cole being shipped to Clarkdale), 8912 tons of 6.18% lease ore, 10 tons of scrap, 918 tons of 55.64% precipitates and 247,418 tons of 1.54% porphyry from the S.E. Extension. Salable metals from ores smelted at Douglas and Clarkdale totaled 84,821,263 lbs. Cu., 1,896,583 oz. Ag. and 47,591 oz. Au. Per pound of copper costs for the 84,821,263 lbs. of salable copper averaged 8.58¢ after a 3.54¢ gold-Silver credit and 80¢ for profit on toll ores and miscellaneous earnings and included 6.68¢ F.O.B. smelters, smelting and converting 2.26¢; freight, selling and refining 1.50¢, western and eastern overhead 0.89¢ and 0.39¢ for taxes.

Marginal ore sold to Metal Reserves and smelted at Clarkdale totaled 143,657 tons with a grade of 3.62% Cu., from the Junction, Cole, Sac, Southwest and Czar-Holbrook divisions. Salable metals from this tonnage were 9,427,266 lbs. Cu., 107,325 oz. Ag. and 4729 oz. Au. Lead-zinc ores with a combined content of 27.62% for 6135 tons from the Junction and Campbell divisions, and sold to Shattuck Denn, returned a profit of \$125,628.62, credited to miscellaneous earnings. By lease 1763 tons of 22.6% manganese ore was mined from the Higgins and sold to Metal Reserve at a profit of \$3,756.52

The limestone divisions worked 326 days, the Junction mining 287,937 tons of 5.47% ore at a daily rate of 883 tons; the Campbell 260,021 tons at 5.79% copper at a daily rate of 798 tons and the Cole division produced 178,893 tons with a grade of 5.92% and 549 tons per day. Most of the 247,418 tons of 1.54% porphyry flux came from the S.E. Extension block cave. Four lessees were active at year's end including the Oliver and produced 8912 tons of 6.18% copper ore. Precipitates totaled 918 tons with a grade of 55.64% Cu., 469 tons from the mine and 449 tons from the Don Luis plant.

Stoping efficiency averaged 6.49 tons per man shift with an overall figure of 2.00 tons. Mining costs in the limestone was \$6.26 and \$1.69 in the S.E. Extension. Timber costs increased from \$43.70 to \$57.15 per M bd. ft. during the year.

Development costs were \$0.82 per ton of ore and included 49,049 ft. of headings, 7323 ft. of stope preparation and 22,552 ft. of diamond drilling. Exclusive of the above footage 3521 ft. of development and 1838 ft. of diamond drilling was done for Metal Reserves and 4789 ft. of headings in the porphyry areas. In the Cole division development work was in the 500 level Powell-Congdon area, on the Hope claim and a connection made to the Congdon shaft on the 800 level. In the Dallas area development was on 1100, 1300, 1400 and 1600 levels. In the Junction-Campbell divisions the ore zone on the 1200 and 2200 levels east of the Campbell fault was explored on the Red Jacket claim. Development work was also expedited for lead-zinc on the 2400, 2566 and 2700 levels on the Judeah, Sophy and Wm. Jennings Bryon claims. Exploration begun in 1942 in the Cuprite and Sunrise claims and isolated areas in the Czar-Holbrook areas was largely negative and was discontinued in 1943. The workings were heavy, caved and the temperatures hot and humid.

The Campbell shaft sinking was started May 14 and extended 50 ft. below the 2700 to 40 ft. below the 2966 level or 256 ft. at a cost of \$85,374.89. The Cole dinky hoist was moved to the Galena and the Galena hoist installed at the Cole for improved hoisting facilities. The Saginaw hoist was installed on the Campbell 2100 level for sinking and a used hoist, purchased from Del Norte Leasing Company, replaced the one removed from Saginaw. The Saginaw shaft served to ventilate the Campbell 2700 level division after a connection was completed on the 2200 level.

Pumping averaged 5742 GPM with a maximum of 6088 GPM on January 8. Water in



1943 (Cont)

the Warren shaft was lowered below the 2200 level and the pumps recovered. At year's end water in the Cochise shaft stood 36 ft. above the 1800 level. Flow in the 2200 level 96 crosscut averaged 637 GFM and that in the 2700 level 12 crosscut decreased from 3850 to 3333 GFM. Pumping for the Denn Company varied from 271 to 294 GFM.

Metal Reserve tonnage shipped to Clarkdale totaled 143,657 tons of 3.62% marginal ores with most of the production from the Junction upper levels and from the Sac division with lesser tonnages from the Czar-Holbrook, Southwest and Cole divisions. Metal Reserves also reimbursed the Company for freight to Clarkdale on 122,998 tons of 5.85% ore mined from regular operations. The Metal Reserve contract was cancelled December 21, effective January 20, 1944. As mining declined equipment belonging to Metal Reserves was stored on surface.

Expenditures charged to appropriations included:

App. No.	Description	Expended
296	New Cole change room	\$ 38,397.96
297	Sinking Campbell shaft 2700 to 3000	85,374.89
298	Mine equipment - 150 cars & 2 locos	<u>39,086.71</u>
	Total	\$ 162,859.56

Operating accounts included the following expenditures:

Mechanical loaders	\$ 3,750.00
Hoist drums	4,680.84
Repairs to Idle shafts	10,072.12
Building of timber trucks	10,790.53
Travel time for furloughed soldiers	8,759.91
Securing furloughed employees from Army	8,740.69
Emergency housing for employees	<u>19,546.79</u>
Total	\$ 66,340.88

Employees decreased from 2003 to 1835 with an average of 1863 on the payroll. Entrants totaled 1245 and terminations 1413 representing a turnover of 5.7%. Of 437 furloughed soldiers reporting from Fort Douglas and Camp McCoy during August and September, only 20 were classified as miners. Of these 296 quit and 167 remained on December 31. Employees entering the armed forces totaled 136 during the year. An increase of 26 cents for day's pay employees was effective February 1, representing an average increase from \$6.93 to \$7.30 or \$8.49 including overtime. The average rate for salaried employees increased from \$8.75 in 1942 to \$9.12 during 1943.

In the trailer camp 119 out of 150 were occupied. The housing project of 59 buildings with 236 dwelling units, was completed in July and at the end of the year 100 units were occupied. Construction of 8 dormitories and a cafeteria was cancelled but the Housing Project Management opened a restaurant in the district.

The Labor Management Production Committees continued holding regular monthly meetings. The Employees Benefit Association continued to function and with a \$18,000 contribution from Phelps Dodge and a year end surplus of \$24,919.74. There were no major changes in administrative personnel. The annual report was signed by H. C. Henrie, General Superintendent and addressed to H. M. Lavender, General Manager



1944

Production from all sources totaled 690,963 tons with gross metal contents of 53,645,735 lbs. Cu., 1,477,260 oz. Ag., 34,828 oz. Au., 8,614,889 lbs. Pb. and 20,385,582 lbs. of zinc. Salable metals from the above production were 58,032,712 lbs. Cu., 1,366,516 oz. Ag., 34,154 oz. Au., 5,995,166 lbs. Pb. and 14,589,506 lbs. zinc.

Shipments to the Douglas smelter totaled 532,284 tons including 373,606 tons of 5.82% limestone ores, 788 tons of 5.80% lease ore, 157,148 tons of 1.95% porphyry flux, 733 tons 41.82% precipitates and 9 tons of scrap. Salable metals were 46,429,518 lbs. Cu., 1,083,813 oz. Ag., and 29,050 oz. Au. Costs per lb. of copper averaged 7.94¢ after a gold-silver credit of 3.56¢, lead-zinc credit of 1.50¢ and 0.61¢ for miscellaneous earnings. The selling price of copper continued at 11.775¢ per lb.

Of the Company mined limestone ores from the Junction and Cole division, 99,110 tons with a grade of 5.91% Cu. were shipped to Clarkdale and also 3998 tons of 3.89% marginal ores mined for Metal Reserve. Salable metals from the Clarkdale smelter were 10,891,249 lbs. Cu., 160,619 oz. Ag. and 4,216 oz. Au.

Of 55,571 tons of 26.09% lead-zinc ores mined from the Campbell and Junction division, 40,399 tons were sold to Shattuck Denn and 15,172 tons shipped to Eagle Pitcher at Sahuarita. In addition to the 5,995,166 lbs. of lead and 14,589,506 lbs. of salable zinc 428,514 lbs. of Cu., 117,359 oz. Ag. and 702 oz. Au. were also recovered.

In 310 working days the Junction mined 195,441 tons of 5.81% copper ores at a daily rate of 630 tons, the Campbell 155,778 tons with a grade of 5.97% at 503 tons per day and the Cole produced 112,220 tons of 5.98% ore. Cole operations were reduced to one shift on October 16 and mining suspended on October 31. After mining 9277 tons of 4.96% copper ore from the Sac, mining was cut back to one shift in March and operations suspended in September. Mining in the limestone areas cost \$6.55 per ton with a stoping efficiency of 6.64 tons per man shift and 1.85 tons for all underground workmen. Per ton costs in the S.E. Extension porphyry averaged \$1.63.

In the porphyry S.E. Extension 157,148 tons of 1.95% flux ore was mined with a larger percentage from top slices. Mining was reduced to a one shift basis in March and flux requirements met by 63,827 tons from the concentrator dumps at a cost of 37.7¢ per ton. Total expenses of \$24,158.91 included \$3,448.25 for a railroad spur and access road; \$10,634.68 for a used D-4 cat and shovel and \$10,076.01 for operating costs. Production by lessees was limited to 788 tons of 5.80% copper ore. Of 55,591 tons of lead-zinc ores, 34,599 tons were mined in the Campbell and 20,972 in the Junction. Price premiums on lead-zinc ores were paid by Metal Reserves and 40,399 tons treated by Shattuck Denn netted a profit of \$17.88 per ton and 15,172 tons treated by Eagle Pitcher at Sahuarita netted a profit of \$9.88 per ton. Underground precipitates totaled 621 tons and Don Luis produced 112 tons from intermittent leaching operations.

Upon cancellation of the Metal Reserve contract, shipments were completed on January 10, 1944. Shipments to Clarkdale were limited to 3998 tons of 3.89% low grade copper ore from the Junction, Cole, Sac, Gzar-Holbrook and Southwest. Shipments under the Metal Reserve contract totaled 173,385 tons at 3.58% Cu. with 11,246,501 lbs. of recoverable copper. In addition to the low grade ore, 99,110 tons of 5.91% ore from regular mining operations during 1944 were treated at Clarkdale with Metal Reserves paying the excess cost of freight. Development work for Metal



1944 (Cont)

Reserves during the entire contract period totaled 3965 ft. of headings and 2064 ft. of diamond drilling.

Development work cost 67¢ per ton of ore mined. Footages for development totaled 31,817; stope preparation 5318 ft. and diamond drilling 28,054 ft. In addition to the above footages, 1320 ft. of headings were driven in the porphyry area caving block and 61 ft. for Metal Reserves. Considerable copper ores were developed on the 2566 level along the Campbell fault in the Pay Day and High Card claims. The Cole ore reserves were increased from the 1000 to the 1300 level and development of the Junction 1600 level on the Des Moines and Harrison claims was stopped in July. Development for lead-zinc included the area southeast of the Campbell shaft on the Regular claim with increased tonnages in the Guard and Well claims. In the Judeah claim, diamond drilling extended lead-zinc mineralization to the 2700 level. Following the cessation of prospecting the Cuprite area, lease mining in the Southwest and opening up the Czar; pipe fittings, track and trolley wire was salvaged from the various workings. A new connection to the Dallas shaft from the Cole 1000 level workings, improved the ventilation from the 1000 to the 1400 level.

The Campbell 2833 shaft station was completed and a heading advanced 226 ft. On the 2966 level the shaft station was finished, a pump sump excavated, three centrifugal pumps installed and the shaft heading driven 564 ft. Major repairs were made to the Briggs 770, 1000, 1100, 1200 and 1400 level shaft stations. The shaft timbers were reblocked and angle braced to permit the use of one compartment. Hoisting of porphyry ore through the Junction shaft was discontinued because of excessive dust conditions.

Pumping averaged 5461 GPM with a maximum of 5837 GPM on January 4. Flow from the 2200 level 96 crosscut decreased from 637 to 505 GPM and that from the 2700 level 12 crosscut remained about constant or 3307 GPM. The flow from the Campbell shaft below the 2700 level increased from 150 to 600 GPM and pumping for Shattuck Denn was up from 213 to 348 GPM. With decreased production, drainage costs increased from 35¢ in 1943 to 56¢ per ton during 1944.

No new surface construction was started during the year. Three appropriation requests were approved with two remaining open at year's end.

<u>No.</u>	<u>Description</u>	<u>Requested</u>	<u>Expended</u>
299	2966 level pump station & equipment	\$38,000	\$10,253.71
300	Campbell Power Cables	38,000	23,191.12
301	Purchase Metal Reserve Mine equipment		<u>192,678.76</u>
	Total		\$226,123.59

Unusual charges to operating accounts included:

Diamond drill equipment	\$ 7,523.25
Repairs to idle shafts	9,261.84
Water door and frame	5,609.83
Discharge billet for pump	3,485.25
Arco flume for drainage	3,480.87
Campbell pump station and sump	12,847.12
Shutdown expense at Cuprite, Cole & Sac	25,495.73
Warren District Recreation center	<u>7,980.31</u>
Total	\$ 75,684.20





The Phelps Dodge Mercantile (see p.84, para. 1)

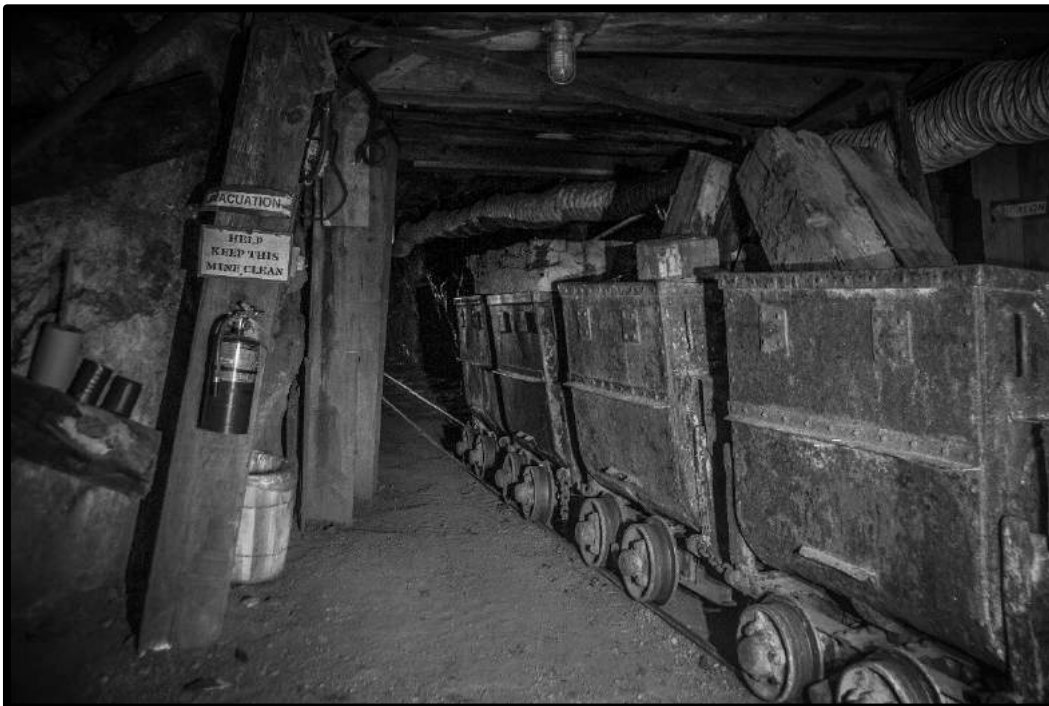


A bit box containing various types of detachable drill bits (see p. 86, para. 4)





Batteries inside a Mancha Locomotive (see p. 86, paragraph 6 & p.89, para. 2)



Four 19 cubic yard H cars hauling scrap timber in the Southwest Mine(see p. 86, para. 6)





Abandoned manganese stope on the Twilight Claim, part of the Higgins Mine(see p.90, para.2)



Equipment abandoned after the leases were canceled, 6th level Southwest Mine(see p. 93, para. 2)



1944 (Cont)

The Federal Housing Authority removed all trailers from the two trailer courts in February. Use of the YMCA for dormitory purposes was discontinued and the building converted into a Community Center. The watchmen force under the Army Provost Marshall since February 10, 1943 was released on June 21, 1944.

With an acute shortage of labor, total employees decreased from 1835 down to 933 and averaged 1327 during the year. The mine dropped from 1211 to 472 and the mechanical department from 249 to 167. The Junction and Campbell were operated at capacity with transfers from the Cole and Sac divisions. Of 895 furloughed soldiers allotted to Bisbee during 1942 and 1943, 865 reported, 101 were recalled, 33 returned to active duty and during 1944, with quits, the number on the payroll decreased to 144. During 1944, 127 employees entered the armed services with 110 being allowed one month's pay. Time lost averaged 13.41% as compared with 11.56% during 1943. Entrants totaled 244, terminations, 1146 with a 6.1% turnover. The day's pay wage averaged \$7.42 or \$8.37 with overtime and vacation pay, etc.

The Non Ferrous Metals Commission authorized two weeks vacations to employees with 5 years service or one additional week. Employees were permitted to work the additional week with the vacation allowance being paid at Christmas, 179 taking advantage of this arrangement. After filing a representation petition by C.I.O. for the underground employees, C.I.O. won over A. F. of L. and the United Mine Workers in an election held during March. Premium shift bonuses were put into effect May 24 and September 24, amounting to 4¢ per hour for the P.M. shift, 8¢ for night and 6¢ for intermediate shifts. The Employees Benefit Association was dissolved December 30 and replaced by a group insurance policy with Equitable. There were no major changes in administrative personnel during 1944.

1945

Production of all classes of ore totaled 363,588 tons with salable metals of 18,770,550 lbs. Cu., 799,809 oz. Ag., 12,354 oz. Au., 16,079,710 lbs. Pb. and 34,663,270 lbs. of Zn. Shipments to the Douglas smelter totaled 363,588 tons including 124,772 tons of 5.89% limestone ore from the Junction and Campbell divisions, 60,622 tons of 2.20% porphyry from the S.E. Extension, 677 tons of 43.91% precipitates and 4 tons of scrap. Salable metals from Douglas shipments were 17,397,636 lbs. Cu., 457,470 oz. Ag. and 10,987 oz. Au. Per pound costs averaged 11.22¢ after a credit of 4.06¢ for gold-silver and 1.55¢ for toll ores and miscellaneous credits.

The Junction and Campbell divisions mined 124,772 tons of 5.89% copper ores and 177,513 tons of 21.31% lead-zinc ore or a total of 302,285 tons at a daily rate of 981 tons during 308 working days. Mining cost in the limestone areas averaged \$ 7.42 per ton and \$1.62 in the porphyry top alices, where production was stopped on July 14. To maintain production in the two divisions, miners were transferred from the S.E. Extension and mining of copper ores was practically replaced by lead-zinc ores during the latter part of the year. Concrete mucking floors were tried in the stopes at a cost of 10¢ per square foot. Of the 677 tons of 43.91% precipitates, 300 tons came from the Don Luis plant and 377 tons from the Junction underground cementation cells.

Until the 400 ton lead-zinc concentrator started operating on November 25, 52,919 tons were treated by Shattuck Denn; 49,598 tons by Eagle Fitcher and 59,022 tons by the Peru Mining Company. Respective profits per ton were \$10.22, \$5.54 and \$4.67. A small 99 ton lot was sold to A.S. & R. as direct smelting ore at a profit of \$67.99 per ton. During November and December 17,093 tons were treated in the Company mill at a profit of \$9.88 per ton, 388 tons per day at a cost of \$2.75 per ton.



1945 (Cont)

In addition to the salable 16,079,710 lbs. of lead and 34,663,270 lbs. of zinc, the lead-zinc ores returned 1,372,914 lbs. of Cu., 342,339 oz. Ag. and 1367 oz. Au.

Of 15,354 ft. of development headings, 6041 ft. were in the lead-zinc areas. Stope preparation required an additional 5649 ft. and diamond drilling 34,180 ft. Development in the S.E. Extension, not included in the above figures, was limited to 377 ft. Opening up the Campbell 2833 and 2966 levels was in heavy ground requiring close timbering and pressure grouting. An appreciable portion of development was directed toward increased reserves of lead-zinc ores on the Bengal claim north of the Briggs shaft on the 1400 ft. level; 1600 level on the Oregon claim; 2300 and 2400 levels in the Mt. Maid claim, Regular and High Card claims from the 1300 to the 1800; Well and Guard claims from the 1800 to the 2200 and in the Judeah claim from the 2300 down to the 2700 ft. level. On the Junction 1300 level a connection was made to the Briggs shaft for ventilation.

Pumping averaged 5043 GPM with a maximum of 5380 on January 6. The flow from the 2200 level 96 crosscut increased from 505 to 525 GPM, pumping for the Denn decreased from 348 to 279 GPM and the water from below the Campbell 2700 level dropped from 600 to 500 GPM. Water stood in the C & C shaft 3.6 ft. above the 1800 level. The Don Luis plant was operated intermittently and the underground precipitation plant constantly.

Construction work included changing the Czar change room into a garage for P. D. Mercantile, razing the Sac Hill office building and the former Copper Queen safety building. The Dallas headframe was rebuilt and underground the Campbell 2833 level shaft pocket was partially excavated and concreted. The J. B. Donaldson Construction Company started erection of the lead-zinc concentrator on May 14, 1945 and completed the work on November 17, 1945.

No.	Amount	Description	Expended	
			1945	To Date
299	\$38,000	2966 pump station & equip.	\$5,044.09	\$15,297.80
300	38,000	Campbell shaft power cables	3,138.58	26,329.70
302A	270,000	400 ton Lead-Zinc Concentrator	258,821.03	258,821.03
303	24,000	Copper Queen Hotel Elevator	None	None
		Total	\$267,003.70	

Unusual charges to operating accounts included:

Diamond drill equipment	\$ 8,057.67
Repairs to Campbell hoist flywheel	13,200.27
Stator coils for Campbell 1000 h.p. hoist motor	1,956.15
Repairs to idle shafts	7,154.69
Spiral pipe for drain lines	3,214.29
Pump repair parts	7,635.03
Campbell shaft ore pocket 2833 level	8,492.59
Shutdown expense-Cole, Sac & other divisions	40,075.60
Diamond drilling-Contract	54,541.55
Total	\$144,327.84



1945 (Cont)

Employees decreased from 933 to 727 in October and 822 as of December 31, 1945. Comparable figures for the underground were 472, 313 and 411 respectively. Entrants totaled 502, terminations 613 including 333 furloughed soldiers or a monthly turnover of 5.1%. In June the War Department started recalling soldiers with final termination date on November 1. During the year 19 employees entered the armed forces making a total of 577 since 1940. Under the National War Labor Board job reclassifications, mine occupations were reduced from 23 to 12 with wage changes retroactive to March 1, 1945. The minimum wage was increased from \$5.16 to \$5.88 with daily pay averaging \$7.57 plus \$1.19 for overtime, vacation pay, contract earnings, etc. Salaried pay averaged \$8.78 per shift. Premium pay for holidays and the seventh day work was cancelled August 21 by Executive Order 9240, but was continued voluntarily by the Company. Group Insurance under Equitable was made available to employees at the beginning of the year.

The following changes were made in personnel:

W. P. Crawford, Mine Supt. to General Superintendent, January 1, 1946
R. C. Thompson, Metallurgist to Mill Superintendent, November 1, 1945
J. W. Fisher, Safety Inspector - Retired October 1, 1945
J. C. Chapman, Office Engineer - Retired December 31, 1945 - 40 years service
C. E. Compton, Chief Chemist - Retired December 1, 1945 - 37 years service.

1946

Production of copper ores from the Junction and Campbell was limited to 46,560 tons with a grade of 5.89% Cu., 3.732 oz. Ag. and .0569 oz. Au. Smelter shipments also included 4 tons of scrap and 444 tons of 45.79% precipitates of which 396 tons was precipitated in the underground plant. Salable metals from the 47,008 tons shipped to Douglas were 5,593,561 lbs. Cu., 167,347 oz. Ag. and 2638 oz. Au. Costs per lb. of copper averaged 15.99¢ after a gold-silver credit of 4.25¢, gain on toll ores of 2.35¢ and 1.66¢ from sales of sulphuric acid and miscellaneous earnings.

Mining of 212,992 tons of 19.88% lead-zinc ores from the Junction and Campbell divisions was at a daily rate of 955 tons during 223 work days. Salable metals included 1,566,946 lbs. Cu., 553,119 oz. Ag., 2107 oz. Au., 18,071,704 lbs. Pb. and 41,631,007 lbs. of Zn. Profits on lead-zinc ores before Federal Taxes totaled \$1,796,061.48 or \$8.43 per ton.

The Junction mined 27,831 tons of 5.70% copper ore and 119,674 tons of 14.43% lead-zinc ores. Production figures for the Campbell were 18,729 tons of 6.17% copper ore and 93,318 tons of 13.48% lead-zinc ores, or a total tonnage of 258,552 from the underground mine at a daily rate of 1164 tons during 223 work days. The Don Luis cementation plant operated in September and December on surface drainage waters from No's. 1, 2 and 7 dumps.

The lead-zinc mill with a 400 ton daily capacity treated 452 tons per day until the strike which lasted 112 days or from March 20 to June 28. Expanding the capacity to 900 tons was started in March, construction by Company labor proceeded through the strike period and although not entirely complete, it was in operation on July 18. During 253 work days the mill averaged 750 tons daily at a cost of \$1.46 per ton treated and at a profit of \$8.49 per ton. During the first three months 6423 tons of lead-zinc ore were shipped to the Peru Mining Company at a profit of \$6.38 per ton; from January to September the Shattuck Denn milled 15,868 tons at a profit of \$7.75 and 1036 tons were sold as direct smelting at a unit profit of \$25.93 per ton to Phelps Dodge.



1946 (Cont)

During 1946 preference was given to mining and development in the lead-zinc areas and with shortage of labor, development was on a one shift basis during part of the year. In the limestones, mining costs increased to \$8.41 per ton. Values of lead-zinc ores averaged \$19.30 per ton with price premiums of \$5.42 per ton and with mining and treatment costs of \$10.87, the profit on lead-zinc ores averaged \$8.43 per ton. Stopping efficiency averaged 4.82 tons per man shift and underground efficiency 1.51 tons. The use of concrete stope floors continued; experimental work done on grouting stope fill and long hole drilling was established for raises not exceeding 30 ft. in length.

Development totaled 12,002 ft., stope preparation 3993 ft. and diamond drilling 18,882 ft. No work was done in the porphyry areas. Added lead-zinc reserves were developed in the Bengal claim to 65 ft. below the 1400 level. On the 1800 and 1900 levels in the Comet claim, ore was developed to above the 1800 level; in the Judeah lead-zinc reserves were extended to the west of the operating stopes up to the 2200 level and also below the 2566 and on the Guard claim 15 ft. of new lead-zinc ore was cut on the 2100 level. The Dallas 900 level station was rehabilitated preparatory to 4800 ft. of planned development in the Powell-Congdon area and driving the Cole adit was started September 20 on a single shift basis. A bulkhead was removed from the C & C 1800 level as a ventilation exhaust for the Junction and 500 ft. of the 2200 level crosscut at the Warren shaft was enlarged for better ventilation.

Pumping averaged 4745 GFM with a maximum of 5144 on February 23. The flow from the 2200 level 96 crosscut increased from 525 to 590 GFM, pumping for the Denn Averaged 226 GFM and drainage of the Warren shaft to the 2700 level through drain holes permitted shutting down the small booster pumps on the 2200 level.

Unusual expenditures included \$5,624.02 in completing the Campbell shaft pocket; \$7,235 spent on the 2966 level pump station and raise to the 2700 level; \$8,061.37 for the Junction 2566 shaft pocket; \$7,388.70 on repairs at the hotel and \$2,669.75 for 51.4 acres adjoining the Company ranch and below the tailings pond.

No.	Amount	Description	Expended	
			1945	To Date
299	\$ 38,000	2966 Pump station & equipment	\$ 97.28	\$15,395.08
300	38,000	Power cables for Campbell shaft	None	6,329.70
302B	270,000	Complete 400 ton lead-zinc mill	7,727.96	266,548.99
303	24,000	Elevator for Copper Queen Hotel	20,742.08	20,742.08
304	190,000	Extension to lead-zinc mill	166,434.00	166,434.00
305	-	Purchase Lot 3 Sec 34 T 23 S R 24 E	2,669.75	2,669.75
306	-	Purchase 3/4 int. Night Hawk claim	7,542.50	7,542.50
		Total	\$205,213.57	

Employees increased from 822 to 1311 or averaged 1023 with 1237 hires and 748 terminations. The underground force increased from 411 to 816 and averaged 769. On April 3, 1946 the C.I.O. preponderantly won over A. F. of L. for representation underground after a strike which lasted from March 20 to June 28 and cost \$314,743.28 at Bisbee and \$128,961.51 at the Douglas smelter. An agreement was concluded with C.I.O. on June 21, 1946. An increase of 18-1/2¢ per hour was retroactive to March 15 and 9-1/2¢ retroactive to October 30, 1945 for those who were on the payroll on June 28, 1946. With a base rate of \$8.50 the daily wage averaged \$10.05 including retroactive pay, overtime, vacation pay, etc. Only two employees entered the armed services and shortage of experienced labor was acute during the first part of the year.



1946 (Cont)

H. H. Schou and W. W. Little were advanced to Assistant Superintendents on January 1, 1947. Howard Barkell, Rental Clark retired on March 1, 1946 after 41 years of service. There were no other changes in salaried personnel.

1947

During 301 working days the Junction, Campbell, Cole and Denn mined 270,719 tons of copper ore with an average grade of 5.63% Cu., 2.704 oz. Ag., .0619 oz. Au. and 286,757 tons of 13.62% Pb-Zn. ores or a total of 557,476 tons at a daily rate of 1852 tons. Shipments to the Douglas smelter included the 270,719 tons of copper ores, 848 tons of 37.54% precipitates and one ton of scrap. Costs per pound for 31,140,285 lbs. of salable copper from direct smelting ores averaged 14.66¢ after a gold-silver credit of 3.99¢ and 0.13¢ for miscellaneous earnings. Salable metals for the total production of 558,325 tons were 33,326,999 lbs. Cu., 1,429,820 oz. Ag., 19,592 oz. Au., 21,307,917 lbs. lead and 56,788,448 lbs. of zinc.

Mining costs averaged \$8.93 per ton including \$6.23 for labor. Stopping efficiency was 4.84 tons per man shift and 2.27 for underground employees. All lead-zinc ores except for 27 tons sold as direct smelting were treated in the new concentrator at a daily rate of 890 tons during 321 work days. Values per ton with \$21.78 for quoted prices and \$0.58 price premiums and \$13.00 costs, including \$8.47 for mining and \$1.65 for milling, resulted in a profit of \$9.36 per ton for lead-zinc ores. With increased selling prices for copper and zinc, premiums were discontinued in November. Of the 848 tons of precipitates, 414 tons with 39.62% Cu. came from the underground plant and 434 tons with a grade of 35.56% was from the Don Luis plant. The dumps near the concentrator were churn drilled and blasted and No. 7 dump was again irrigated.

The Shattuck Denn surface plant, Denn shaft and mining rights were purchased on March 8, 1947 for the sum of \$300,000. Production began April 1 on a one shift basis and double shifted starting April 20. Most of the mining was on the 2800 and 2900 levels in producing 42,214 tons of 5.90% copper ore and 936 tons of lead-zinc ore during the remainder of the year. Development work amounted to 2597 ft., stope preparation 424 ft. and diamond drilling 5883ft, mostly in the Ophir, Tryeangle and Williams claims.

Development in all divisions included 24830 ft. of headings, 6841 ft. for stope preparation and 43,239 ft. of diamond drilling, with none in the porphyry areas. The main northerly headings on the 2833 and 2966 levels were connected to the Denn shaft. The Cole adit was advanced 3903 ft. to a distance of 3966 ft. from the portal and holed the Powell shaft 25 ft. below the 400 level. The Dallas 900 level development of the Powell-Congdon area was limited to 300 ft. and stopped while constructing the Dallas hoisting plant. Development work increased the lead zinc reserves by 11.3% in the Bengal, Baton Rouge claims from the 1300 to the 1500 levels and on the Oregon and Mt. Maid claims on the Junction 2833 level. Most of the increase in the Campbell division was on the 1200 level in the Regular and High Card claims.

Work was completed on the Campbell shaft loading pockets and ore transfer raises above the 2833 level. Work continued on the 2966 level pump station and the pump column raise holed the 2700 level. The 2700 level Campbell station was enlarged and the floor pressure grouted. Pumping averaged 4616 GPM with a maximum of 4907 GPM on January 12. The flow in the 2200 level 96 crosscut varied from 590 to 636 GPM and acid water above the 1800 level from 107 to 127 GPM.



1947 (Cont)

Unusual charges to operating accounts included:

Campbell 2833 level ore pocket	\$ 8,085.73
Campbell 2966 pump station & sump	2,482.29
Campbell 2966 level pump column raise	9,127.58
Campbell 2833 transfer raise	<u>5,104.20</u>
Sub total	\$24,799.80
Maintenance of idle divisions	23,759.13
Diamond drill contract	33,407.93
Diamond drill equipment	33,342.90
New rock drills	14,000.00
Painting office, hoist houses, shops & concentrator	24,093.95
Paving Junction & Campbell shaft areas	6,349.96
Alterations to P. D. Mercantile Lowell store	6,395.08
C. Q. Hotel-kitchen remodeling, recarpeting & painting	<u>24,658.86</u>
Total	\$190,807.61
24 lots sold in Bakerville	Credit 4,044.50

Appropriations included:

No.	Amount	Description	Expended	
			1947	To Date
299	\$38,000	Campbell 2966 pump station	\$ 6,660.25	\$ 22,055.33
300	38,000	Campbell shaft power cables	1,060.84	27,390.54
303A	24,000	Copper Queen Hotel elevator	5,094.30	25,836.38
304A	190,000	Extension to lead mill	21,140.30	187,574.30
307	572,000	Dallas Hoisting plant	172,521.35	172,521.35
308	110,000	Warren Store building	36,165.47	36,165.47
309	20,000	Denn mining claims	20,000.00	20,000.00
310	280,000	Denn shaft & surface plant	280,000.00	280,000.00
311	6,791.37	7-1/2 ton Hyster Lift Truck	6,673.05	6,673.05
312	18,800	C.Q. Hotel Kitchen equipment	17,349.97	17,349.97
313	1,750	Five Warren lots for store	1,750.00	1,750.00
315	26,000	Thew-Lorraine shovel crane	-	-
		Total	<u>\$568,415.53</u>	

Underground employees increased from 816 to 829 and total payroll from 1311 to 1421 including 236 on salary with an average of 1489 after 1640 entrants and 1530 terminations or a labor turnover of 7.9%. Ten employees entered the armed services but monthly pay allowances were discontinued June 30. An increase of 11-1/2¢ was effective May 6 for A. F. of L. and 12¢ per hour for C. I. O. on July 1, 1947. The 1/2¢ difference was given to A. F. of L. on August 17. Wages averaged \$9.31 per shift or \$10.67 including overtime, holiday pay and shift premiums. Holiday pay for time not worked was increased from one-half to a full shift allowance. Vacations were also increased to one week for employees with less than five years service and two weeks for those with over five years.

Accidents at Bisbee resulted in 4 fatalities, 44 serious and 15 slight injuries. Forty-one codes of safe operating procedures were prepared. An underground training department for shift bosses, miners and muckers was inaugurated in March for instructions in basic safety rules.

During 1947 one pension was granted, 83 remained on the payroll in December and pension payments totaled \$56,640.41. Under the Group Insurance Plan, participants at year's end included 1492 Phelps Dodge and subsidiary employees and 167 former employees with premiums of \$70,438.04 borne by employees and the Company.



1947 (Cont)

Taxes totaled \$746,058.47 for social security, sales taxes and \$497,054.13 for property taxes at Bisbee based on a mine valuation of \$19,791,254. Rates per \$100 of valuation were; State \$1.00, County \$0.76, School District No. 2 \$1.03 and \$2.65 for City of Bisbee.

Retirement included the following salaried employees:

Name	Occupation	Date	Yrs. Service
Dr. Charlton Jay	Examining Physician	2-1-47	22
Thomas Mason	Surface Foreman	6-1-47	39
Christopher Marshall	Cole Division Foreman	11-1-47	35
J. Smith	Dispensary Clerk	2-1-47	38
Mrs. Alice Sinclair	Librarian	6-1-47	15

1948

The Junction, Campbell, Cole and Denn mined 302,941 tons of limestone ores with an average grade of 6.14% Cu., 2.748 oz. Ag. and .0557 oz. Au. Shipments to the Douglas smelter totaled 303,343 tons including 381 tons of 51.58% precipitates and 21 tons of scrap. The per pound costs for the 35,901,192 lbs. of salable copper in smelting ores averaged 16.02¢ including 10.75¢ delivered to the smelter, 4.14¢ for smelting and converting; 1.808¢ for freight, selling and refining; 1.508¢ for western and eastern overhead; 1.097¢ for taxes and after credits of 3.667¢ for gold-silver and 0.222¢ in miscellaneous earnings.

Production of lead-zinc ores from the Junction and Campbell with 713 tons from the Denn totaled 218,466 with an average combined metal grade of 21.01%. Underground production of both classes of ore totaled 521,407 and mined at a daily rate of 1676 tons during 311 work days. Salable metals from the entire production of 521,809 tons were 37,605,506 lbs. of copper, 1,349,631 oz. Ag., 18,715 oz. Au., 17,594,329 lbs. Pb. and 46,933,556 lbs. of zinc.

The mine worked 311 days on a 6 day per week schedule. Shortage of experienced miners and underground labor continued and adverse conditions arising from the Campbell fire which started January 22, resulted in lower production, efficiencies and higher costs. With decreasing reserves, the Denn as a division was terminated October 4 after mining 76,155 tons of copper ore and 2038 tons of lead-zinc ore. The Don Luis plant was shut down on February 25 because of low heads with 2.97 lbs. per 1000 gallons, after shipping 109 tons of 63.02% concentrates. The underground plant produced 272 tons of precipitates with a grade of 46.93% copper.

Mining costs averaged \$10.77 per ton including \$3.29 for extraction or \$10.97 for copper ore and \$10.52 for lead-zinc. Fighting the Campbell fire cost \$217,869 or 42¢ per ton mined. Higher costs were due to increases in pay, cost of materials, higher smelting charges of 4.14¢ and an increase in freight, selling and refining from 1.630 to 1.808¢ per lb.

The lead-zinc concentrator operated 311 days in milling 218,466 tons at a daily rate of 702 tons; 188 tons less than the 890 rate in 1947 because of shortage of ore. Costs totaled \$15.58 per ton including \$10.52 for mining and \$2.06 for milling. With higher metal prices revenue increased to \$32.39 leaving a profit of \$16.81 per ton. Arrangements were started to permit milling of copper ore and a regrind mill and classifier installed.

Development during 1948 was largely devoted to opening up areas for mining with a limited amount of pioneer work. The footages in the Campbell were curtailed



1948 (Cont)

sharply by the mine fire. Development headings totaled 23,056 ft., stope preparation 8032 ft. and diamond drilling 65,935 ft. The Cole adit was completed with some prospecting of the mineralized areas in the Illawarra and Lucky claims. The Cole 1400 level haulage drift to the Dallas shaft was also finished. A limited amount of work to the east of the Campbell fault, as recommended by Dr. Schwartz was done and development of the mineralized areas on the 2833 and 2966 levels in the Judeah and Protection claims showed some progress.

On January 22 a fire started in the Campbell 2200 level 58 stope and rapidly spread up to the 1500 level. A churn drill hole near the Campbell shaft was drilled and starting on April 3, 951 cars of tailings were sluiced into the fire area. Acid resisting pumps were installed on the Junction 2200 and 2300 levels to handle the runoff which was lined on the 2200 level. Considerable mining equipment was lost and \$217,869 spent in fighting the fire which added 42¢ per ton to mining costs.

Progress in the 2966 level pump station was limited to pressure grouting the ground but no excavating was done. Pumping averaged 4729 GPM, acid water from above the 1800 level varied from 72 to 107 GPM and water from the Denn was diverted by ditch to the Campbell on the 2966 level.

The Wade Hampton pit was developed as a source of smelter flux with the Company supplying a 1-3/4 yd. electric shovel, a 29-T churn drill and four 22-1/2 yd. trucks transferred from other branches. Shipments began in August and 69,414 tons averaging 82.2% silica were mined at a cost of \$1.70 per ton, including 23,919 tons under a contract during the first stages of development.

Appropriations included:

No.	Amount	Description	Expended	
			1948	To Date
299	\$38,000	2966 Pump station & equipment	286.16	\$ 21,761.17
300	38,000	Campbell shaft power cables	205.88	27,596.42
307A	572,000	Dallas surface plant	221,792.74	394,314.09
309B	110,000	Warren store	80,559.23	116,724.70
315A	26,000	Thew-Lorain Shovel crane	25,959.42	25,959.42
316A	40,000	Alteration Lead-Zinc mill	40,154.84	40,154.84
317A	25,000	Shop equipment-radial drill, air Compressor and welder	20,328.68	20,328.68
318	2,000	Purchase State Highway office-Galena	2,000.00	2,000.00
319	400,000	Build 50 Galena houses	292,806.90	292,806.90
320	346	Douglas transmission line right-of-ways	346.00	346.00
		Total	\$688,439.85	

Employees increased from 1421 to 1520 including 226 on salary and averaged 1430 with 1162 entrants, 1063 terminations and a 5.6% turnover. Underground employees increased from 829 to 949 and averaged 861. Accidents totaled 80 with 3 fatalities, 50 serious and 27 slight resulting in a frequency of 24.77 per million man hours and severity of 6.01%. Sixty-nine of these time-lost accidents occurred underground. A wage increase of 12¢ per hour was granted to A. F. of L. on June 23 and to C. I. O. effective June 29. Wages averaged \$10.43 per shift or \$11.92 including overtime, vacation, holidays and shift premiums.

Under the Selective Service Act of 1948 the plan for allowing one month's pay and other privileges to employees entering the armed forces, discontinued on June 30, 1947, was placed back into effect on June 24, 1948.



1948 (Cont)

Pensioners totaled 80 as of December 31, 1948 with \$59,959.38 charged to pension payments during the year. The pension plan for salaried employees at the Copper Queen Branch totaled 132 with Company contributions of \$26,702.99. Under the Equitable Group Insurance Plan, 90.2% of the Branch employees participated and \$73,640.42 was paid for 241 claims, including 15 deaths. Taxes totaled \$592,260.34 including social security, unemployment, sales tax, auto lieu tax and \$367,198.62 for property taxes based on a mine valuation of \$17,278,745 and average tax rate of \$2.13.

H. C. Henrie's death occurred on April 23 having been employed since April 1, 1908. J. B. Pullen replaced Mr. Henrie on May 15 as Manager, transferring from the United Verde Branch. W. P. Crawford was advanced from Assistant to General Superintendent on May 15 and H. H. Schau from Assistant to Mine Superintendent on July 1, 1948.

1949

The Junction, Campbell, and Cole mined 138,413 tons of copper ore, including 1798 tons from former Denn property, with an average grade of 6.03% Cu., 2.91 oz. Ag. and .063 oz. of Au. Shipments to the Douglas smelter included 434 tons of 41.70% underground precipitate. Salable metals from 138,847 tons were 16,049,466 lbs. Cu., 391,802 oz. Ag. and 8846 oz. Au. Per pound costs averaged 16.80¢ after gold-silver credits of 4.122¢ and 0.123¢ for miscellaneous credits. Costs are exclusive of \$327,385.91 for shutdown expense.

Production of 281,520 tons of 19.85% lead-zinc ores came from the Junction and Campbell, of which 2666 tons was mined from former Denn property. The total Copper Queen Branch production of 281,520 tons was at a rate of 988 tons during 285 work days with salable metals of 18,992,772 lbs. Cu., 1,072,925 oz. Ag., 11,495 oz. Au., 20,767,088 lbs. Pb. and 56,838,463 lbs. of Zn.

During the first three months mining costs were high particularly with unavailable ores in the Campbell fire zone. With declining metal prices, measures were undertaken in April to economize and reduce costs. Operations were curtailed to 5 days, mining of copper ores was suspended and by June production of lead-zinc was confined to the Junction and Campbell division. Six days per week were resumed on October 31.

Mining costs for all underground ores averaged \$10.13 per ton with \$3.09 for extraction and 5.93 tons per man shift stoping efficiency. Mining methods were 39.3% by square set, Mitchell slice 39.1%, Cut and Fill 7.1% and 14.5% by other methods. No additional sources of water were developed and pumping averaged 4587 GPM as compared with 4729 GPM during the previous year.

The entire production of 280,743 tons of lead-zinc ores was milled at Bisbee with a daily rate of 848 tons during 331 work days, with the work week varying from 5 to 7 days to fit in with mine production. The concentrator produced 28,243 tons of 42.58% lead concentrate and 62,708 tons of 52.93% zinc concentrate with a milling cost of \$1.86 per ton. Costs per ton totaled \$14.15 including taxes, overhead and depreciation. With revenues of \$22.68, the profit per ton averaged \$8.53.

Development headings totaled 22,680 ft. and 49,548 ft. of diamond drilling including 7003 ft. by contract. A waste supply system for the Junction and Campbell involved 2079 ft. of drifting and 759 ft. of raises. Of the total, 3357 ft. of drifts and crosscuts explored undeveloped areas on the Campbell 1200 and 2833 levels;



1949 (Cont)

the Junction 2300 level and from the Cole adit. All new ore was found around known ore areas and no new lead-zinc deposits were discovered. Development costs totaled \$457,406.68 or \$1.09 per ton of ore mined.

Controlling the Campbell fire continued throughout the year by bulkheads, brattices and sliming with mill tailings; a total of 66,450 tons having been introduced since the start of the fire. At year's end portions of the 1300 and 1400 levels were reopened for mining.

Operations at the Wade Hampton were intermittent and dependent on smelter requirements. Flux totaled 87,105 tons with a silica content of 83.7% including 1435 tons of 89.5% silica from the Monarch claim and used for reverberatory patching. Costs averaged \$0.86 per ton delivered to the smelter.

Appropriations included:

No.	Amount	Description	Expended	
			1949	To Date
299	\$38,000	2966 pump station & equipment	\$ 868.02	\$ 20,893.15
300	38,000	Campbell shaft power cables	67.79	27,664.21
307A	469,500	Dallas surface plant	37,006.31	431,320.40
319	400,000	50 Galena Houses	102,176.61	394,983.51
321	10,000	Bolt cutter & pipe machine	4,864.25	4,864.25
322	14,500	Lift truck, scoomobile & trailer	14,255.51	14,255.51
323	16,000	40 garages at Galena	12,906.32	12,906.32
324		Tax deed for Golden Era claim	8.64	8.64
		Total	\$170,417.41	

Employees decreased from 1520 to 734 at the end of the year and included 352 underground, 46 at the concentrator and 143 on the salaried payroll. The payroll averaged 1051 during 1949 with 322 entrants, 1108 terminations and labor turnover of 3.0%. Layoffs during the middle of the year eliminated many green and inexperienced workmen. Earnings per shift for day's pay employees averaged \$12.12. Accidents resulted in 24 serious and 19 slight injuries with \$46,826.43 paid to the Industrial Commission for insurance. Copper Queen Branch employees under the Group Insurance Plan decreased from 1371 to 713 and from 1656 to 962 including the Mercantile, Warren Company, Cochise Publishing Company and former employees. Premiums totaled \$81,734.53 and \$33,223.56 was paid out for sickness, accident and death claims. Taxes amounting to \$655,096.10 included social security, sales taxes and a property tax of \$495,981.71 based on a \$14,191,083 valuation for the mine.

The position of Mine Superintendent was eliminated, W. A. Nowlin was made Chief Clerk and the accounting, labor and supply department combined at Bisbee and Douglas under the same department head. H. Z. Stuart assumed the duties of Chief Engineer and W. G. Rogue was advanced to Chief Geologist.

1950

Production from the Copper Queen Branch totaled 372,589 tons with salable metals of 26,493,806 lbs. Cu., 1,011,354 oz. Ag., 13,202 oz. Au., 11,429,116 lbs. Pb. and 32,949,358 lbs. of Zn. The Junction, Campbell and Cole divisions mined 218,404 tons of copper ores with a grade of 5.98% Cu., 3.15 oz. Ag. and .055 oz. Au. of which 21,532 tons of 5.91% ore from the Cole was sent to the concentrator. In addition to the 304,903 tons of direct smelting ores, shipment to Douglas smelter included 6224 tons of 17.26% copper concentrates, 455 tons of precipitates and cleanup concentrates.



1950 (Cont)

Production of 24,866,042 lbs. of copper in direct smelting ores cost 12.81¢ after a gold-silver credit of 4.00¢. Production costs exclude \$1,195,683.64 charged to shutdown expense.

The mining of 153,730 tons of 20.63% lead-zinc ores was confined to the Junction and Campbell divisions and milled in the lead-zinc concentrator. Per ton costs for lead-zinc ores totaled \$14.24 per ton including \$9.56 for mining and \$2.19 for milling. Revenues averaged \$23.41, resulting in a profit of \$9.17 per ton for 156,114 tons milled. In 304 working days the mine averaged 1224 tons per day with a stoping efficiency of 6.73 tons and per ton costs of \$9.55 for all tonnage mined.

Underground operations during 1950 were directed toward converting from the mining of lead-zinc to copper ores, completion of the Cole-Dallas and Denn waste systems, reopening of the Cole mine, completion of the Campbell 2966 pump station and installation of water doors. Production from former Denn claims included 9044 tons of copper and 752 tons of lead-zinc ore. With the depletion of lead-zinc reserves the production rate decreased from 22,986 tons per month during the first quarter to 6280 tons during the last quarter. Mining of copper ores increased from 1466 tons during January to 36,738 tons in December.

Exploration and development totaled 79225 ft. including 10,305 ft. of crosscuts, 4068 ft. of raises, 1191 ft. of Calyx holes and 63,650 ft. of diamond drilling, 1418 ft. of which was contracted. The Cole waste and ore transfer systems required 3701 ft. of drifts, 435 ft. of raises and 1172 ft. of 48 in. Calyx holes. In reopening the Campbell fire zone on the 1900 and 2000 levels, 424 ft. of crosscuts were driven. The remaining footage was primarily for the development of stopes and known ore areas. As of January 1, 1950, reserves of copper ores were estimated at 7,168,654 tons with a grade of 5.6% Cu., including 3,127,404 tons of probable ore. Lead-zinc ores were estimated at 471,520 tons with combined metals of 20.6%, including 29,400 tons of probable ore.

During the first seven months, 24,440 tons of tailings (90,890 tons to date) were piped into the Campbell fire area and \$46,630 spent in fire control and reopening from the 1400 down to the 2200 level. Pumping averaged 4390 GPM with 11.54 inches of rainfall during the year. The Wade Hampton pit operated according to smelter requirements and shipped 92,083 tons of 85.2% silica at a cost of \$0.75 per ton F.O.B. smelter. Of this tonnage 2131 tons of 92.9% silica came from the Monarch and used for reverb patching.

The concentrator worked three shifts until August 1 when it was cut back to two shifts as the production of lead-zinc ores decreased. With increasing production of milling ore from the Cole division, three shifts were resumed on October 23 and operations rotated between the two classes of ore. The mill treated 19,871 tons of 5.90% Cole ore in 42 operating days at a daily rate of 473 tons, \$2.08 milling cost and produced 6224 tons of 17.26% copper concentrates. During the entire year, 156,114 tons of 20.63% lead-zinc ores were milled at a cost of \$2.19 per ton and at a daily rate of 598 tons during 261 work days.



1950 (Cont)

Production of 24,866,042 lbs. of copper in direct smelting ores cost 12.81¢ after a gold-silver credit of 4.00¢. Production costs exclude \$1,195,683.64 charged to shutdown expense.

The mining of 153,730 tons of 20.63% lead-zinc ores was confined to the Junction and Campbell divisions and milled in the lead-zinc concentrator. Per ton costs for lead-zinc ores totaled \$14.24 per ton including \$9.56 for mining and \$2.19 for milling. Revenues averaged \$23.41, resulting in a profit of \$9.17 per ton for 156,114 tons milled. In 304 working days the mine averaged 1224 tons per day with a stoping efficiency of 6.73 tons and per ton costs of \$9.55 for all tonnage mined.

Underground operations during 1950 were directed toward converting from the mining of lead-zinc to copper ores, completion of the Cole-Dallas and Denn waste systems, reopening of the Cole mine, completion of the Campbell 2966 pump station and installation of water doors. Production from former Denn claims included 9044 tons of copper and 752 tons of lead-zinc ore. With the depletion of lead-zinc reserves the production rate decreased from 22,986 tons per month during the first quarter to 6280 tons during the last quarter. Mining of copper ores increased from 1466 tons during January to 36,738 tons in December.

Exploration and development totaled 79225 ft. including 10,305 ft. of crosscuts, 4068 ft. of raises, 1191 ft. of Calyx holes and 63,650 ft. of diamond drilling, 1418 ft. of which was contracted. The Cole waste and ore transfer systems required 3701 ft. of drifts, 435 ft. of raises and 1172 ft. of 48 in. Calyx holes. In reopening the Campbell fire zone on the 1900 and 2000 levels, 424 ft. of crosscuts were driven. The remaining footage was primarily for the development of stopes and known ore areas. As of January 1, 1950, reserves of copper ores were estimated at 7,168,654 tons with a grade of 5.6% Cu., including 3,127,404 tons of probable ore. Lead-zinc ores were estimated at 471,520 tons with combined metals of 20.6%, including 29,400 tons of probable ore.

During the first seven months, 24,440 tons of tailings (90,890 tons to date) were piped into the Campbell fire area and \$46,630 spent in fire control and reopening from the 1400 down to the 2200 level. Pumping averaged 4390 GPM with 11.54 inches of rainfall during the year. The Wade Hampton pit operated according to smelter requirements and shipped 92,083 tons of 85.2% silica at a cost of \$0.75 per ton F.O.B. smelter. Of this tonnage 2131 tons of 92.9% silica came from the Monarch and used for reverb patching.

The concentrator worked three shifts until August 1 when it was cut back to two shifts as the production of lead-zinc ores decreased. With increasing production of milling ore from the Cole division, three shifts were resumed on October 23 and operations rotated between the two classes of ore. The mill treated 19,871 tons of 5.90% Cole ore in 42 operating days at a daily rate of 473 tons, \$2.08 milling cost and produced 6224 tons of 17.26% copper concentrates. During the entire year, 156,114 tons of 20.63% lead-zinc ores were milled at a cost of \$2.19 per ton and at a daily rate of 598 tons during 261 work days.





Lawrence Banks in the Cole Adit at a salvaged blower station in 1963
(see p.100, para. 2, p. 101 para. 5 & p. 104 para. 1)



The remains of the Denn Mine headframe (see p. 101 para. 4)





Codes of Safe Practice (see p.102, para. 4)



A miner operating a tugging hoist at a Calyx drill (see p.107, para. 2)

