

## Early Patterns of the Krugerrand

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**Cautionary Note:** A pXRF analyser was used in this study to determine the metal content of a number of Krugerrands. These instruments are useful to indicate the presence of various metals in alloys, but it is not accurate enough to make statements about the fineness of the gold or whether the coins meet the exact requirement as stipulated in the various coinage acts. Care should therefore be exercised with the results and readers should do their own research on the accuracy of pXRF analysers.

### ABSTRACT

*A set of two 1967 Krugerrands recently surfaced which sheds more light on the early Krugerrand patterns produced by the Mint. The coins were struck in the Die and Medal Section of the Mint for the purpose of having the coins photographed for the Proclamation in the Government Gazette. The two coins in the set are different colours and a pXRF analysis indicated that the alloys contain slightly different amounts of copper, silver and zinc. Coins of 6 different colours were apparently produced by the Mint for the Minister of Finance to choose the one that should go into production. It is investigated in this study if these two coins could have been part of these early experiments to find a suitable alloy. The two coins in the set contain small amounts of zinc as part of the alloy. pXRF scans of a number of other Krugerrands and gold coins indicated that none of the production coins contained any zinc. The weight of one of the coins in the set (33.3g) is also significantly below the standard weight of the Krugerrand (33.9g) as specified in the Coinage Act. This set should possibly be considered as early Krugerrand patterns based on the arguments presented in the paper.*

### INTRODUCTION

Very few patterns of the Krugerrand have emerged over the years. This is not unexpected as well-established designs from historic coins were used for the Krugerrand and there was probably no need to strike many patterns. In a letter to the Secretary of the Treasury dated 8 March 1967, the Director of the Mint, Mr JJ Groenewald, refers to a pattern of the proposed Krugerrand that accompanied the letter (see third paragraph, Figure 1). The Afrikaans wording in the letter related to the pattern is: “...en ‘n patroon afdruk word hiermee voorgelê.” The whereabouts of this “patroon afdruk” is currently not known. It is not clear if it was actually struck as a coin or if it was simply a sketch of the proposed design. The Secretary of the Treasury replied to the letter on 17 March 1967 stating that the design was approved, except



that Krugerrand must be one word (Figure 2). The "pattern" must therefore have been similar to the 1967 coins, except that the name Krugerrand would have appeared as two words.

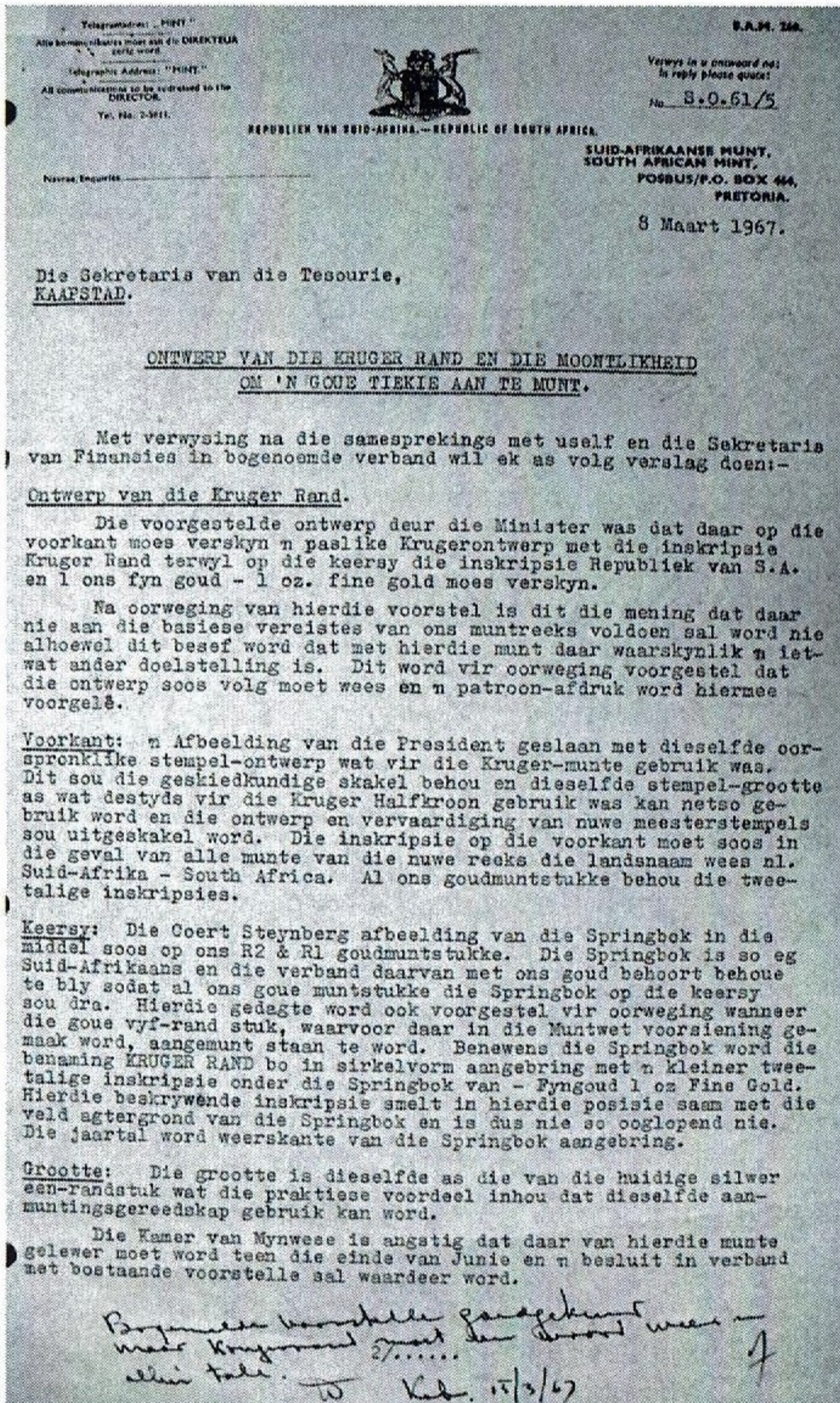


Figure 1. Historic letter from the Mint proposing the design of the Krugerrand. Note the use of the two words "KRUGER RAND" in the subject line.



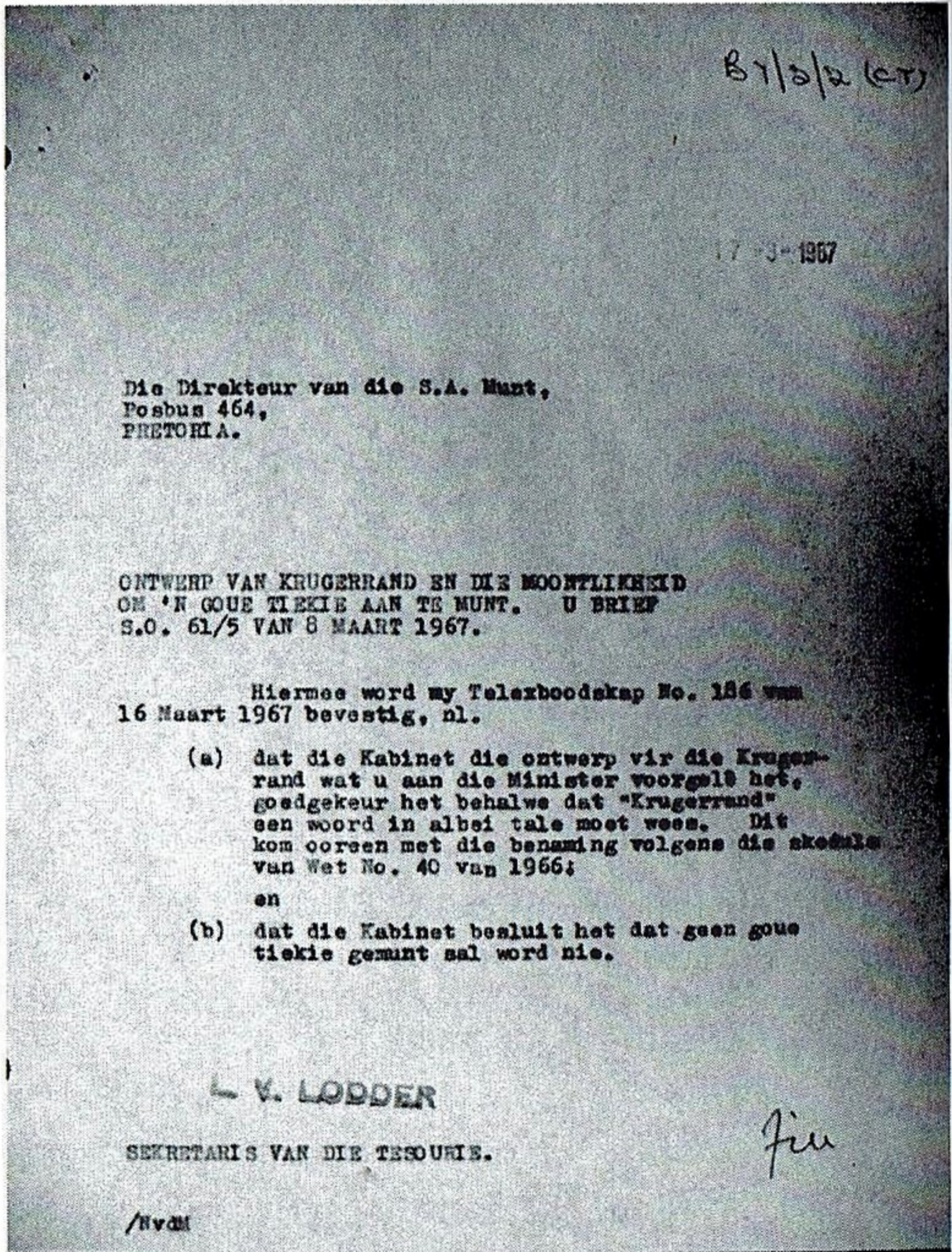


Figure 2. Approval of the Krugerrand design with the request that the word "Krugerrand" should be one word.

It is known that the Mint in the late 1960's proposed designs using photograph cuttings and lettering pencilled onto these designs. An example of this is shown in Figure 3. It is hypothesised that a similar approach was possibly followed for the pattern of the Krugerrand referred to in the letter of Mr Groenewald.





**Figure 3.** An example of how the Mint proposed some coin designs in the late 1960's. This was for the change from Van Riebeeck to the Coat of Arms on the obverse of the coins. This design is stored in the National Archives of South Africa. It is feasible that a similar design was made for the Krugerrand as there were existing designs to photograph.

The dies and punches of the 1967 Krugerrands are in storage at the South African Mint. Some of these are shown in Figure 4. It is dated 15-5-67 and "Krugerrand" is one word on the reverse die (although it is spelt as two words on the side inscription on the obverse die). Dies of the 1967 Krugerrand are also shown in the book by Malan (2016) which is dated 17-5-67. These dies and punches were only made after the so-called pattern was submitted to the Treasury in March 1967 and it supports the hypothesis that the original proposed Krugerrand design could have been a design similar to the format shown in Figure 3.



**Figure 4:** Punches for the Krugerrand. These are dated 15-5-67.



In his Handbook on South African Coins and Patterns 2014/15, Hern states that six Krugerrand patterns of different colours are stored in the vaults of Rand Refinery. The Minister of Finance apparently selected the one that went into production. It is not clear what alloy he selected and how it changed over the years. Recent discussions with Rand Refinery indicated that they are not in possession of these six colour patterns, so the current whereabouts of these coins are not known. No additional information regarding these coins could be found by the author.

Another possible 1967 pattern is the Krugerrand struck in silver. There is currently one of these "patterns" on display at the SA Mint Museum at Coin World. It is listed in Hern as A70, but he does not consider this as an official pattern (but rather as an unusual piece struck using official dies and probably unauthorised). No information regarding the striking of this silver 1967 Krugerrand could be found. Tommy Sasseen also indicated in recent discussions that he cannot recall striking silver Krugerrand coins. This supports Hern's view that these are not official patterns.

#### **SPECIMENS STRUCK FOR THE PROCLAMATION IN THE GOVERNMENT GAZETTE**

A set of two 1967 Krugerrands recently surfaced which provides additional information on the Krugerrand specimens struck before official production of the coin began. The two coins are housed in a small blue box and accompanied by two black and white photographs and a handwritten note by the Director of the Mint, Mr Groenewald. The set is shown in Figure 5.

The blue box housing the coins appears to be similar to the boxes used for the sets of two R1 silver coins (English and Afrikaans) made available by the Mint from 1966 to 1969. The diameter of the Krugerrand is similar to that of the silver R1 coin (32.7 mm) and the Krugerrands therefore fit correctly into the recesses.





J. J. Groenewald

DIRECTOR,  
SOUTH AFRICAN MINT,  
PRETORIA.

There are two of the first two  
Krugerrand pieces struck in the  
die & medal section of the S.A. Mint  
for the purpose of having the coin  
photographed for the Proclamation  
in the Government Gazette.  
Struck during June, 1967. The  
first production coins are to be  
struck during July, 1967.  
Groenewald - 30/6/67.

**Figure 5.** The set of 1967 Krugerrands accompanied by photographs for the Government Gazette. The set contains a hand-written note by the Director of the Mint, Mr Groenewald, on the back of his business card. The note is dated 30/6/67 and was written before the first ceremonial striking of the production coins on 3 July 1967.



The wording on the business card states:

*These are two of the first few Krugerrand pieces struck in the Die & Medal Section of the S.A. Mint for the purpose of having the coin photographed for the Proclamation in the Government Gazette. Struck during June, 1967. The first production coins are to be struck during July, 1967.*

The photographs accompanying the set are similar to those used in the Proclamation shown in Figure 6.

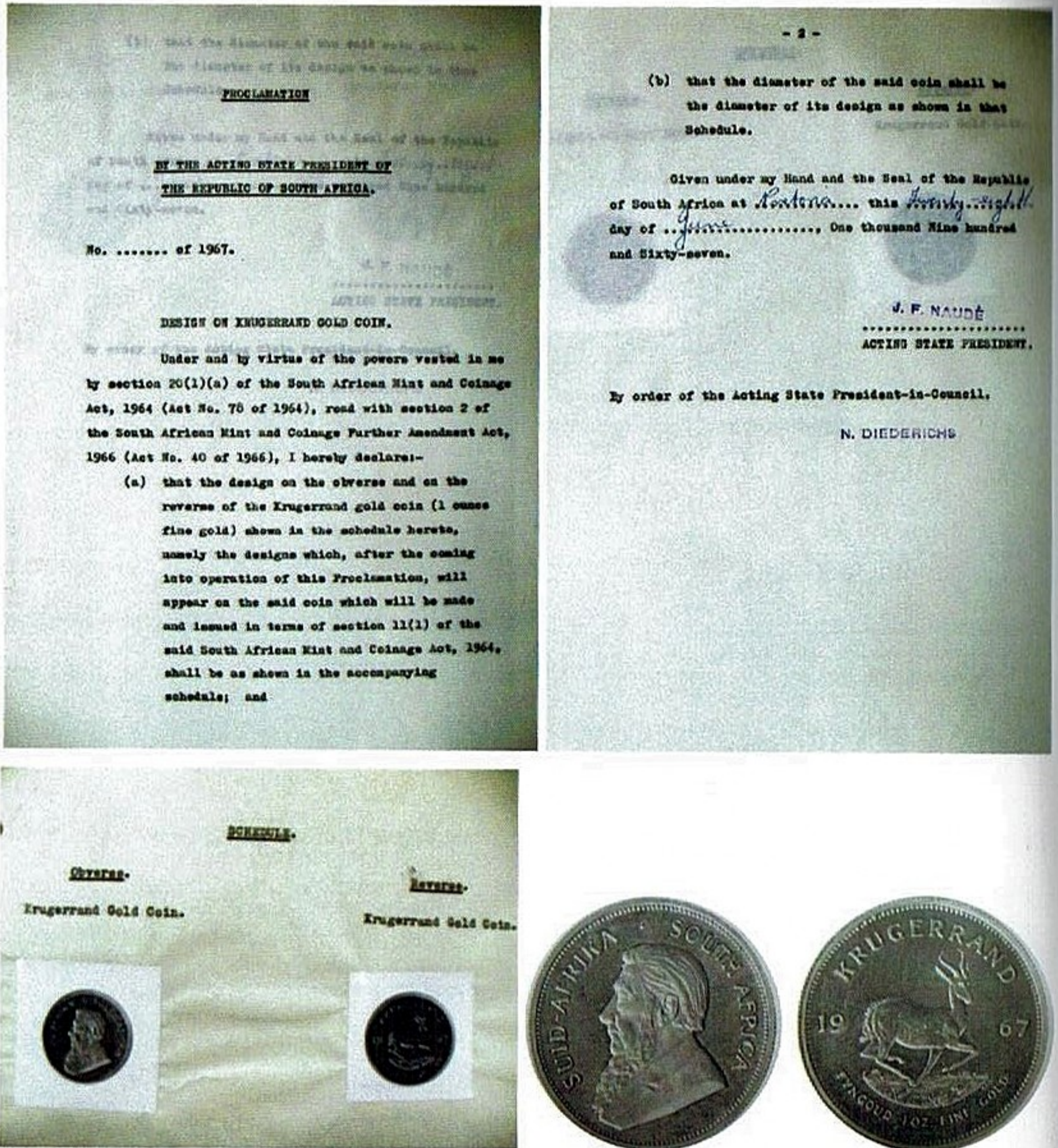


Figure 6. Proclamation of the Krugerrand coin on 28 June 1967. This document is stored in the National Archives of South Africa. The coins on the right are higher quality photographs of those pasted on the document on the left. These are similar to the ones shown in Figure 5 (e.g. compare the dark spots around some of the letters on the obverse).



Six copies of the Proclamation documents were produced as described in the letter shown in Figure 7. The letter is dated 16 June 1967, implying the coins in Figure 5 were struck before 16 June 1967.

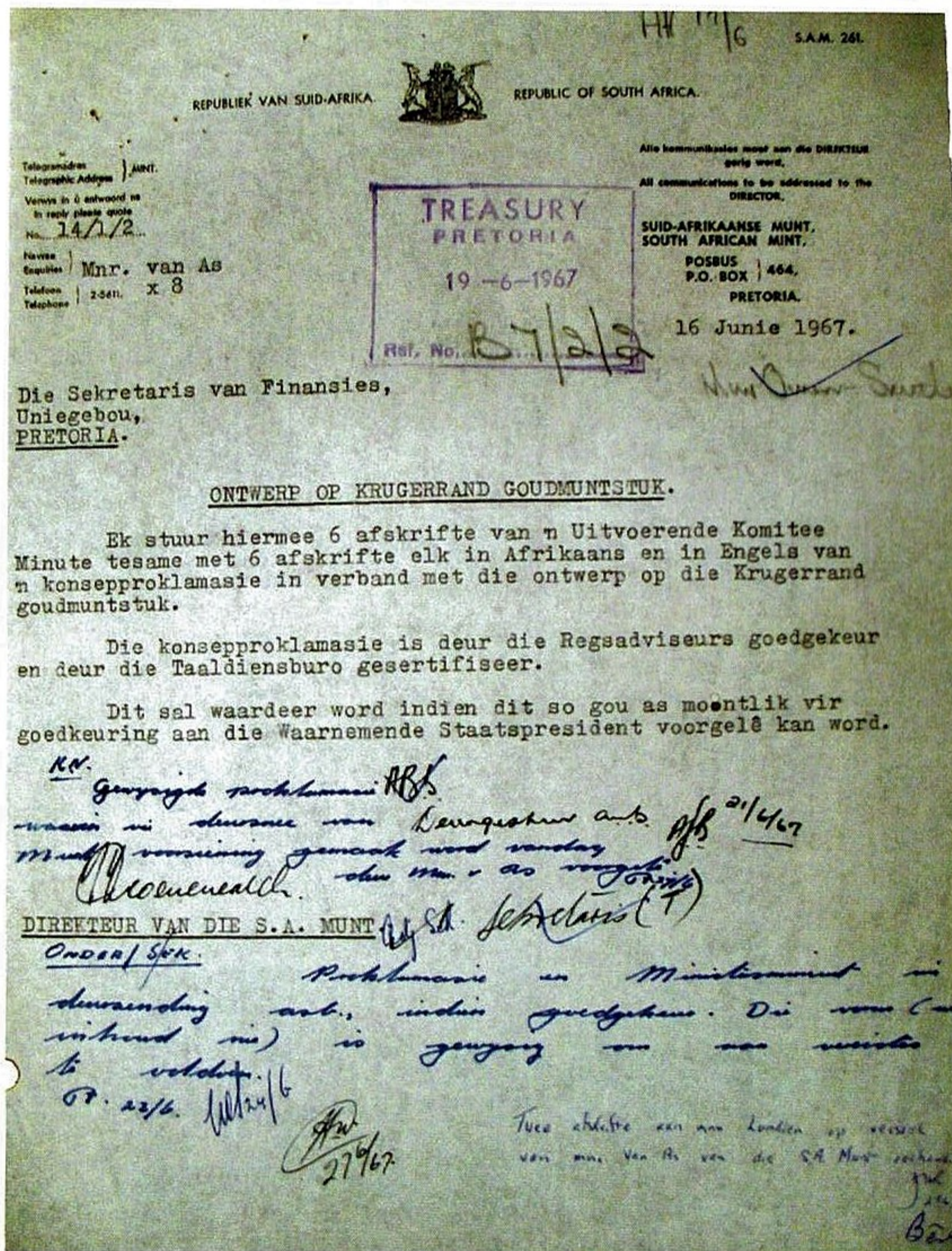


Figure 7. Letter from the Mint to the Secretary of the Treasury describing the documents for the Proclamation of the Krugerrand. This letter is stored in the National Archives of South Africa.



A historic photograph of the Die and Medal Section at the Mint is shown in Figure 8. A recent discussion with Tommy Sasseen (Manager of the Die and Medal Section in 1967) confirmed that the press shown in this photograph was used to strike coins in this department.

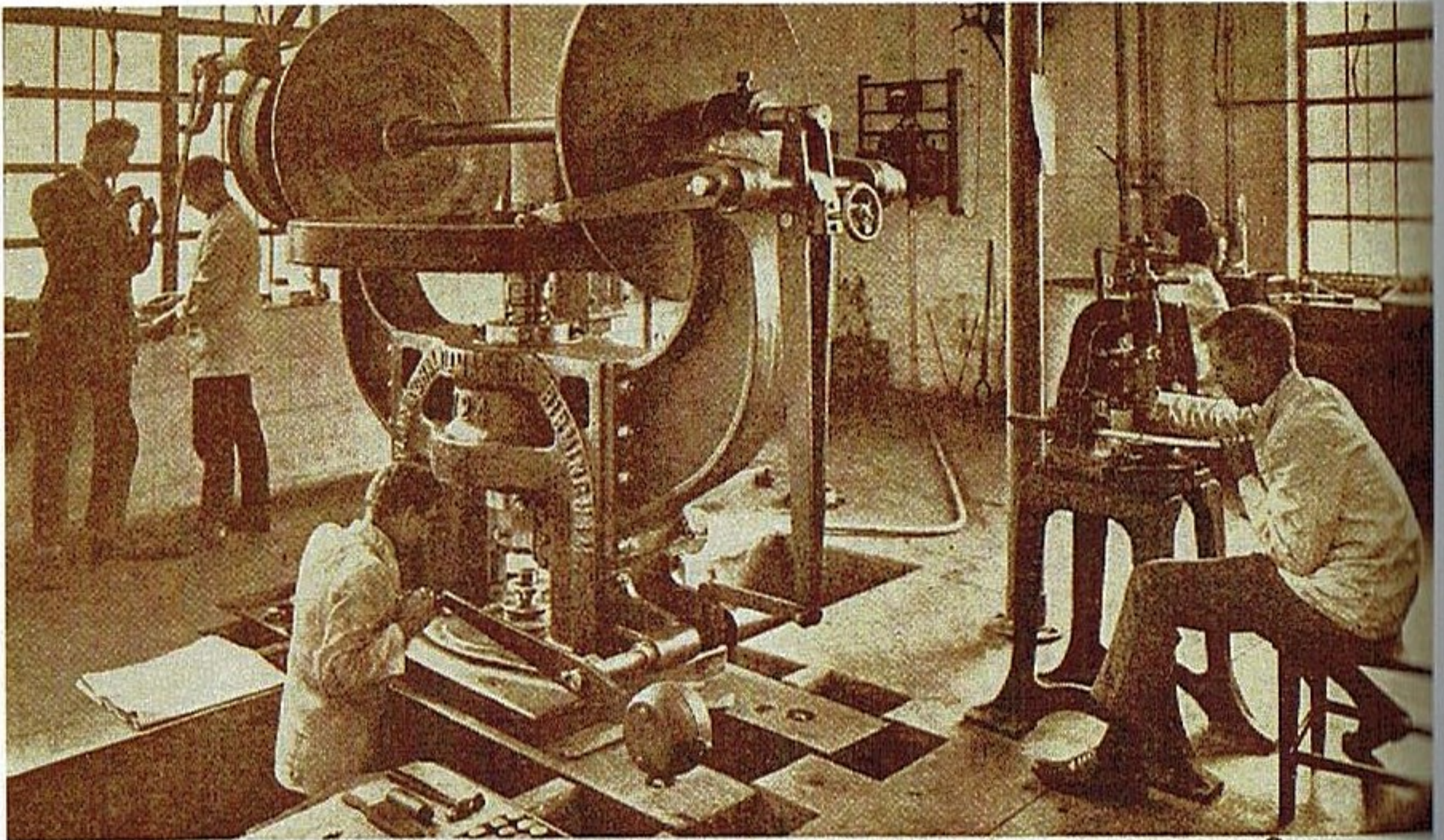
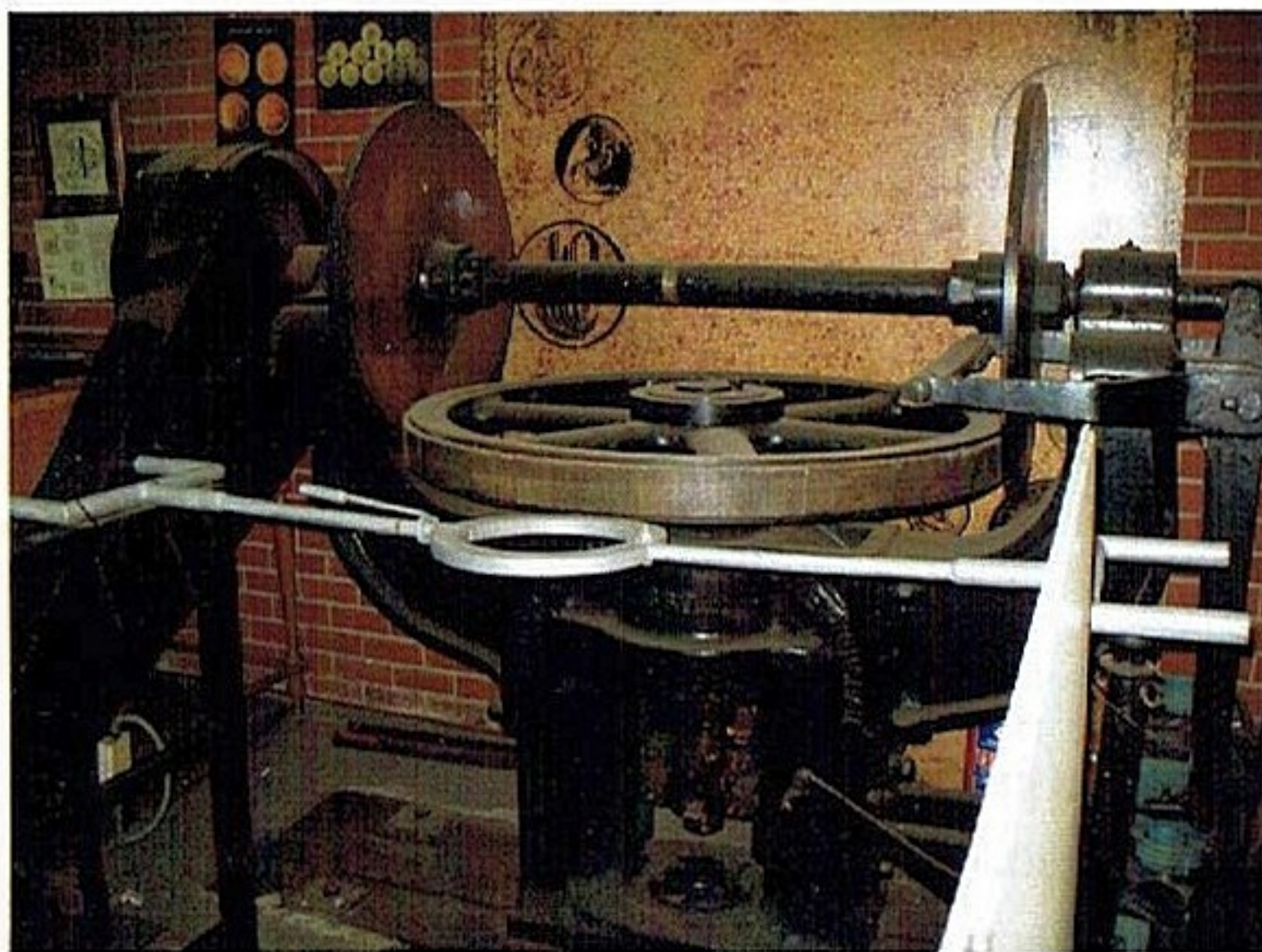


Fig. 13.

*Royal Mint, Pretoria. Die and Medal Press.*

Copyright.

**Figure 8.** The Die and Medal Section of the Mint photographed in the 1930's. This section of the Mint apparently remained unchanged until the building of the new Mint started in October 1968 (Sasseen, 2017; Malan, 2013). The Krugerrand set shown in Figure 5 were struck on this press.



**Figure 9.** A photograph of a smaller Taylor & Challen press of the type shown in Figure 8.



## ALLOY CONTENT AND COLOUR OF THE SPECIMENS

The colour of the two coins of the set in Figure 5 is different (red and yellow, see Figure 10), and a pXRF (portable X-ray Fluorescence) analyser was used to determine the alloy content.

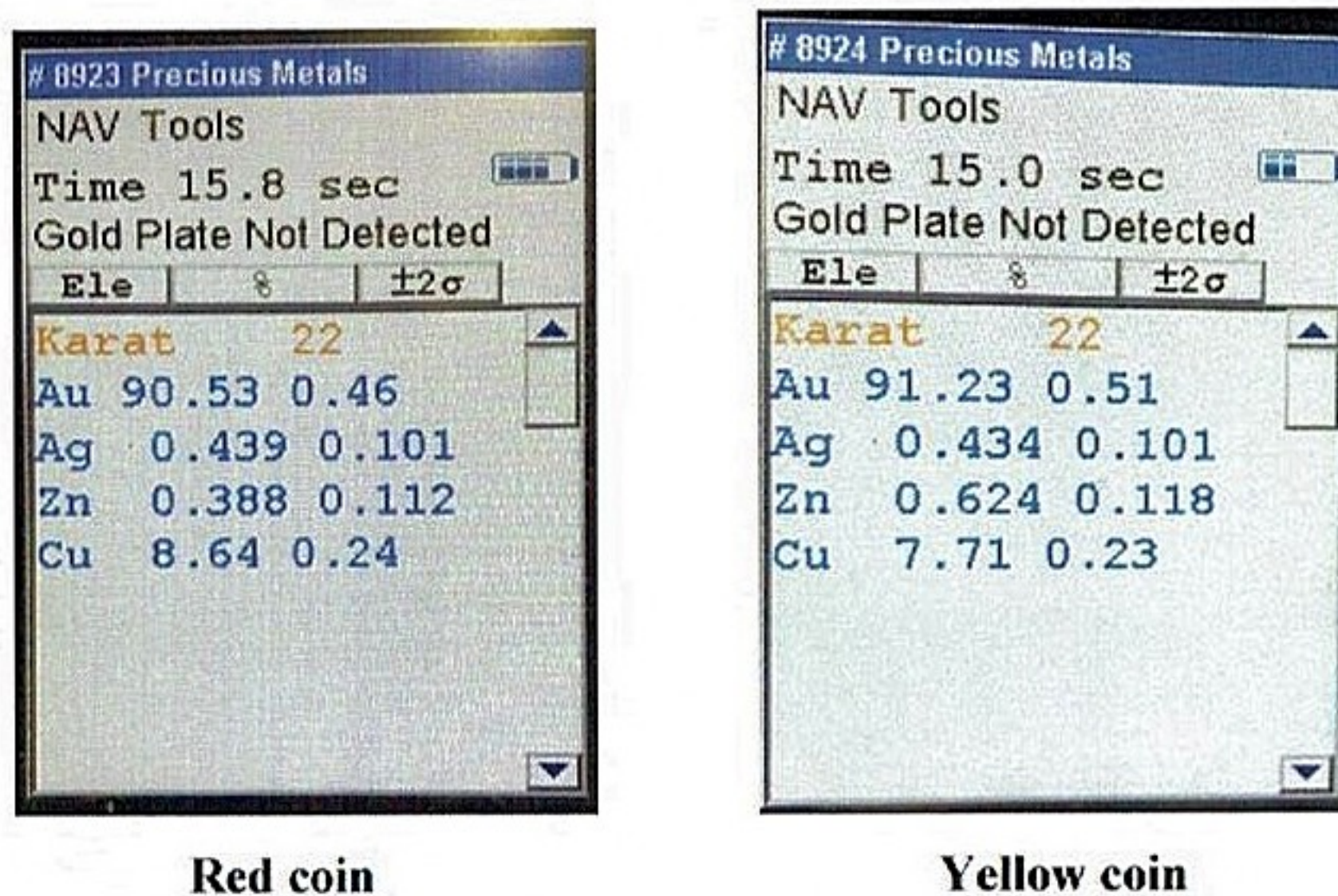


**Figure 10.** High quality photographs to illustrate the difference in colour between the two coins in the set shown in Figure 5. The coins were photographed side by side with the same lighting conditions and camera settings to illustrate the difference in colour.

The results from the pXRF analysis are shown in Figure 11. Both coins are 22 carat and contain silver, zinc and copper as an alloy. The copper (Cu) content is much higher than silver (Ag) content. The zinc (Zn) content is approximately double in the yellow coin compared to



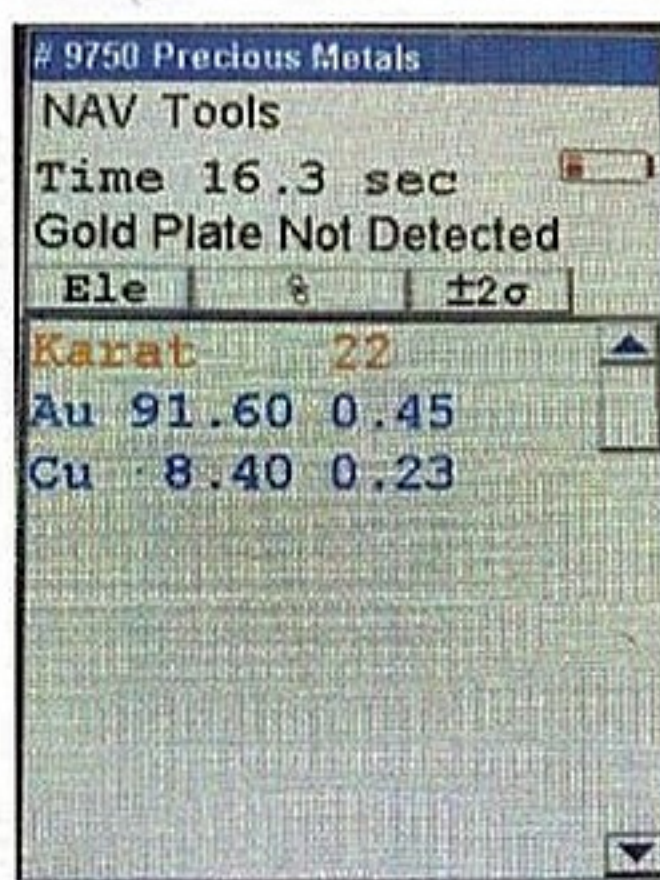
the red coin. Cretu and Van der Lingen (2017) stated that zinc (Zn) additions can be added to alloys of the Au-Ag-Cu system to change the red colour of copper-rich alloys to reddish yellow or dark yellow. This supports the observation that the coin with the higher zinc content is more yellow. The zinc and silver content in the coins is nevertheless small ( $\approx 1\%$ ) and it is not clear if these were attempts to engineer the alloy or if these were simply impurities.



**Figure 11.** Photographs of the pXRF analyser screen for the two coins shown in Figure 10.

Note that these results are only approximate within the accuracy of the analyser (see the cautionary note at the beginning of the paper).

As control specimens, a variety of production gold coins were also analysed. For example, Figure 12 illustrates the pXRF data for a 1979 proof Krugerrand coin. Note that in contrast to the coins in Figure 11, it only contains gold and copper. Surprisingly, this particular coin appeared to be more yellow than the modern Krugerrands that also only contain gold and copper. The data for the various other coins scanned are shown in Table 1.



**Figure 12.** Photograph of the XRF analyser screen for a proof 1979 Krugerrand coin.



**Table 1.** Alloy composition of a number of coins scanned with a pXRF analyser. The numbers in the table are percentages. The statistical parameters shown in Figures 11 and 12 are not included in this table. Note that these results are only approximate within the accuracy of the pXRF analyser (see the cautionary note at the beginning of the paper).

Coin	Year	Au	Cu	Ag	Zn	Fe
Krugerrand (Groenewald - yellow)	1967	91.23	7.71	0.434	0.624	
Krugerrand (Groenewald - red)	1967	90.53	8.64	0.439	0.388	
Krugerrand	1967	91.03	8.21	0.446		0.313
Krugerrand	1979	91.6	8.4			
Krugerrand (½ Oz)	1980	91.3	8.41	0.29		
Krugerrand	2017	90.53	9.47			
£1 (Yellow coin)	1955	91.11	4.19	4.7		
£1 (Red coin)	1955	91.54	8.07	0.386		
£1 (Yellow coin)	1960	90.79	4.6	4.61		
2R (Yellow coin)	1960	90.74	4.08	5.18		
2R (Red coin)	1968	91.61	8.02	0.372		
2R (Red coin)	1974	91.33	8.56			

It is striking from the results in Table 1 that only the two Krugerrands in the Groenewald set contain zinc (Zn). Also interesting is the alloy differences of the well-known yellow and red gold coins from the long and twin proof sets in the 1950's and early 1960's (see Hern's catalogue). In the yellow coins, the alloy consists approximately of equal amounts of copper (Cu) and silver (Ag) whereas in the red coins it is predominantly copper. It is not clear why the yellow coin in the Groenewald set does not also contain a larger percentage of silver if the objective was to obtain a yellow coin. Note the small amount of iron (Fe) in the 1967 production Krugerrand and additional coins from this year needs to be scanned to determine if this impurity is also present in other coins.

The Krugerrands in the Groenewald set were weighed and measured and the data is provided in Table 2. The weight of the yellow coin (33.3g) does not meet the specification of The South African Mint and Coinage Further Amendment Act (No. 40 of 1966) of a standard weight of 33.93107g and a least current weight of 33.71792g.

**Table 2.** Dimensions and mass of the Krugerrands.

Coin	Diameter (mm)	Thickness (mm)	Mass (g)
Red	32.71	2.86	33.9
Yellow	32.73	2.78	33.3



From the information available, it cannot be determined if the different colours of the coins in the Groenewald set (Figure 10) were part of an experiment to engineer the colour of the Krugerrand. The presence of the small amount of zinc could simply have been an unwanted impurity. The alloy for a 22 carat yellow coin was well known to the Mint in those years (e.g. the yellow gold coins in the twin proof sets of the 1950's) and this alloy could have been used if a yellow Krugerrand was desired. Prior to 1967, the Chamber of Mines had already exported a large number of the R2 gold coins to Switzerland (Malan, 2016) consisting of the reddish alloy containing approximately 8% copper. There is no obvious reason why the Mint or the Minister of Finance wanted to change this for the larger Krugerrand. The set of 6 Krugerrand patterns of different colours supposedly stored at Rand Refinery was not seen by Hern, but it was reported to him by a well-known South African numismatist and dealer of the 1970's and 1980's. The question can therefore be posed if these 6 patterns were not simply from this early batch struck in the Die and Medal Section at the Mint. Is it possible that the impurities, such as zinc, and variations in the blank preparation procedure (see paragraph below) accidentally resulted in coins with a slightly different colour? This requires additional research.

Levine (1974) gives the following reason for the different colour of the gold half ponde of the ZAR: *"The colour of the coins varies from yellow to gold with a reddish tinge. This is due to different alloys having been used; yellow being predominately silver; and reddish, larger proportions of copper. Both colours appear in all years."* The effect of blank preparation on the colour of the gold coins was described as early as 1898 by B.W. Begeer. He was the first assayer of the State Mint in Pretoria. In contrast to Levine, Begeer (1898) stated that during the annealing process of the planchets for the ZAR gold coins: *"All oxidation must be prevented, to ensure the production of red coins having the colour of the gold copper alloy of standard fineness. (When oxidation occurs, part of the copper on the surface is removed in pickling, giving the coins a lighter colour.)"* He also states that the gold alloy was only made up of refined gold and pure copper. This then contradicts Levine's explanation of the different colours for the coins.

Regarding modern legislation, the 1964 and 1966 Coinage Acts simply stated: *"Eleven-twelfths fine gold, one-twelfth alloy; or millesimal fineness 916.6"*. The type of alloy was not prescribed in the act. The South African Reserve Bank Act 90 of 1989 was more prescriptive



and for the Krugerrand it states: "916.7 parts elemental gold per thousand, balance copper including trace elements".

Of further interest is that the blanks for the Krugerrands in 1967, 1968 and 1969 were manufactured by the South African Mint and not Rand Refinery. Fisher (1987) states that Rand Refinery only started producing Krugerrand blanks in February 1970 after the Chamber of Mines decided to increase the Krugerrand production. These initial blanks from Rand Refinery were produced on equipment borrowed from the Mint. The difference in blank preparation at the old Royal Mint, the second Mint at Visage Street, Rand Refinery and the modern Mint in Midrand needs to be researched to possibly better understand the variations in Krugerrand colours. Rand Refinery installed a continuous casting machine for the production of the strip to manufacture gold blanks and production started in October 1983 (Fisher, 1987). It is clearly stated in the flowsheet of this process that only copper and gold is used in the alloy.

### SUMMARY

A set of two 1967 Krugerrands recently surfaced which sheds more light on the early Krugerrand "patterns" produced by the Mint. These coins were struck in the Die and Medal Section of the Mint for the purpose of having the coins photographed for the Proclamation in the Government Gazette. Tommy Sasseen was the manager of the Die and Medal Section during this period. Recent discussions with him indicated that he typically struck specimens in this department to test the dies after he prepared it for the production department. These early Krugerrands struck in the Die and Medal Section are therefore of special interest as it was probably struck by Tommy Sasseen himself.

The two coins in the set are of a distinct different colour and a pXRF analysis indicated that the alloys contain different amounts of copper, silver and zinc. Coins of 6 different colours were apparently produced by the Mint for the Minister of Finance to choose one that should go into production. It was investigated if these two coins could have been part of early experiments to find a suitable alloy. It contains a small percentage of zinc in the alloy which is not present in the production coins. From the information available, it could not be determined if the zinc was simply an impurity or part of an experiment to engineer the colour of the Krugerrand. The weight of the yellow coin (33.3g) is also significant below the standard



weight of the Krugerrand (33.9g) as specified in the Coinage Act. This set should therefore possibly be considered as official Krugerrand patterns based on the date of striking, the different colour of the coins, the slightly different alloy, the deviation from standard mass and the motivation for the striking. pXRF scans of a number of other Krugerrands and gold coins from different years indicated that none of these productions coins contained zinc.

All the Krugerrands scanned for this study, even the early more yellowish coins, indicated that the alloy contains approximately 8% copper. It is well established that the Mint used an alloy of approximately 4% silver and 4% copper if it desired a yellow coin. There is no indication that this yellow alloy was ever used for a Krugerrand. The reason for the variety of colours of the Krugerrands seen in different years is therefore possibly due to other reasons and the blank preparation procedure in the early years must be further investigated in this regard.

### ACKNOWLEDGEMENTS

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