CHAPTER 4

SOURCE AND GEOLOGICAL SETTING

4.1 Introduction

The samples used in this study were collected from a tailings dam at Rosh Pinah in Namibia. Figure 8 shows a plan representation of this tailings dam.

4.2 Source

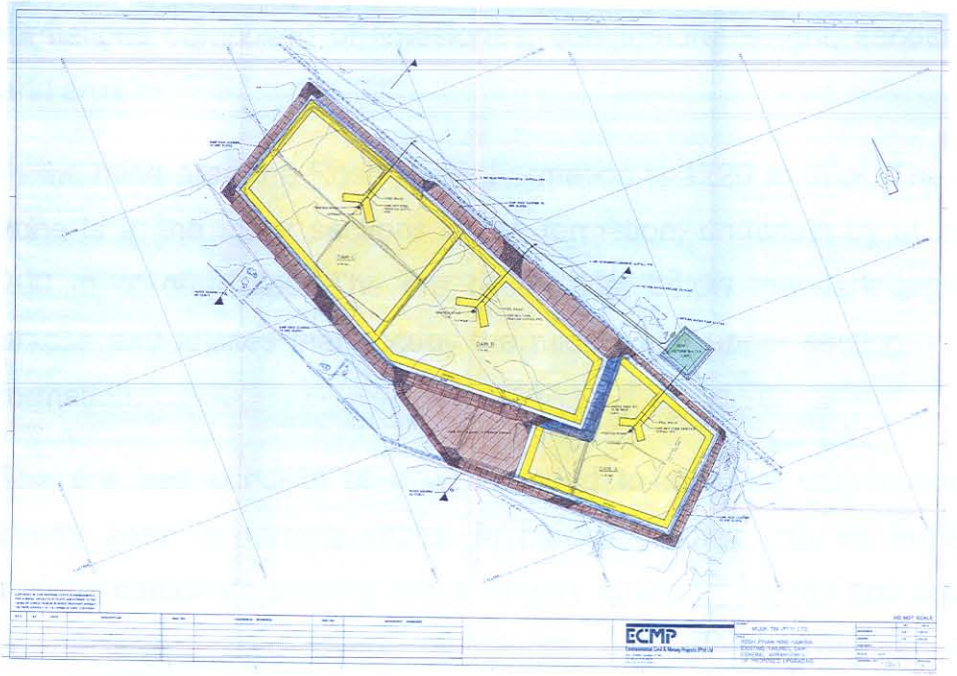

Figure 8: Drawing of the tailings dam where the samples were collected

4.3 Geology

Porter (2001) reports that the Rosh Pinah Zn, Pb, Ag deposit, which is basically strata bound, is hosted by the arkoses and quartzites of the

Rosh Pinah Formation in the lower sections of the late Proterozoic to early Palaeozoic Gariep Complex, an equivalent of the Damaran Supergroup. In this area the basement to the Gariep Complex is made up of Richtersveld Sub-province (Vioolsdrif Terrane) igneous rocks of the Namaqualand Metamorphic Complex. The type section of the Rosh Pinah Formation that forms the base of the Gariep Complex comprises a thin basal mixtite/conglomerate overlain by a thin unit of mafic volcanics. These are succeeded by thicker felsite and rhyolite lavas, pyroclastics and epiclastics, followed by a thin dark argillitic arkose, more felsic volcanics and then the main thick sequence of arkoses, comprising arkose, graded quartzite, argillite and dolomite. A further felsic volcanic unit is found near the top of these arkoses. These rocks of the Rosh Pinah Formation are overlain by further formations composed of limestones, conglomerates, grit, sandstone and argillite.

In the mine area the Rosh Pinah Formation is 1220 m thick. The ore zone is in the lower sections of the formation, underlain by at least 200 m of quartzites. The ore occurs just below the dark argillitic arkose and felsites that occupy the middle and upper section of the formation.

The ore bed consists of a well-banded to massive carbonaceous cherty zone or microquartzite, in places grading into an argillite; various carbonate bearing rocks; sugary quartzite; lenses and bands of massive mixed pyrite, sphalerite and galena; argillite and intercalations of generally poorly mineralised quartzite. The microquartzites are fine-grained and dark due to their carbonaceous content. Barium-rich carbonate is an important constituent in places. The lower sections of the ore bed are generally Zn-rich microquartzite, overlain by further microquartzites or carbonates with a higher Pb:Zn ratio, while the hanging wall is another microquartzite grading to

argillite. Most of the ore is within the microquartzites; it rarely occurs in the argillites. The ore minerals are generally present as intergranular disseminations and discrete blebs associated with a fine-grained, sugary quartz-carbonate matrix, or as thin bands from 1 mm to a few centimetres thick of massive sulphide. Irregular barite-carbonate or dolomite lenses are present in the central or lower part of the ore bed. Massive sulphide bands may be up to a few metres thick in sections of the mine within microquartzites and occasionally argillites, and may grade laterally into disseminated ore within the microquartzites or carbonates.

In contrast to the hanging-wall quartzite, which is generally little fractured, the footwall quartzite is intensely fractured, forming a breccia that is silicified and carries sulphide and carbonate veining.

The ore deposit comprises a number of lenses distributed over an area of some 2 x 3 km, each of 150 000 t to 2 to 3 mt. The structure is variable, with ore bodies ranging from steeply dipping to flat to folded.

4.4 Sampling

Samples were collected by two different methods:

- V-trench and
- reverse circulation drilling.

4.4.1 V-trench

During 2000 a v-trench was dug with the help of Rosh Pinah personnel and samples were collected vertically on the face of the freshly exposed material. The photograph in figure 9 shows the digging in progress.

Figure 9: Photograph of the sampling trench in the tailings dam

4.4.2 Reverse circulation drilling

Figure 10 shows the path of the sample from the bit to the sample bag.

The velocity of the material travelling up the pipe is enough to deliver the sample in the sampling bag.

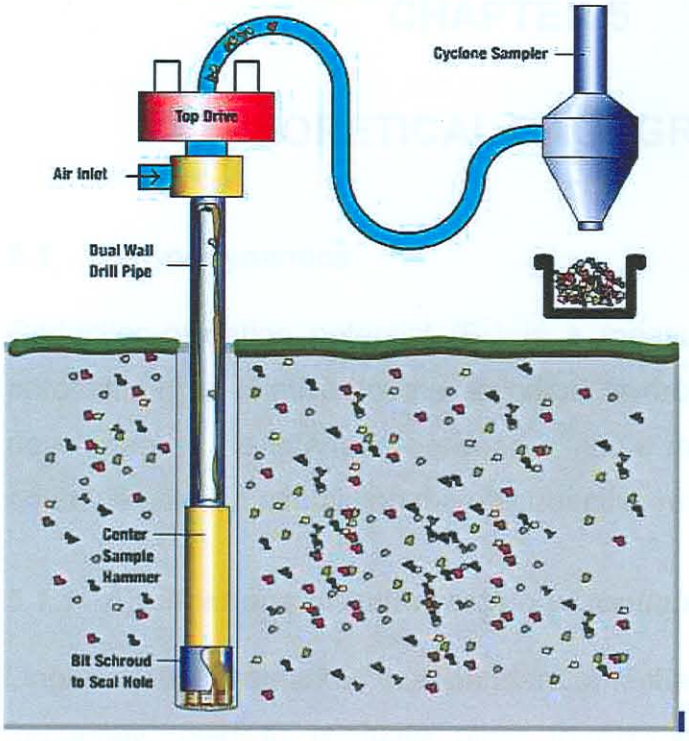

Figure 10:Graphical representation of the reverse circulation drill sampling process (Midnight Sun Drilling 2002)

Reverse circulation drilling was also attempted during 2001. The results were less favourable because fine material was lost during the operation.