# Wind erosion of tailings dams and mitigation of the dust nuisance

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## Synopsis

Wind erosion can be a major cause of the loss and dispersion of tailings material from a tailings dam into its surrounding environment. Such dust dispersion can be a serious nuisance, as well as a health hazard to inhabitants in nearby settlements, and can also damage the health of animals, degrade crops, making them less marketable, and cause soil and water pollution. The problem of wind erosion can affect tailings dams in all types of climate, but becomes worse as climatic aridity increases.

Because clouds of dust are often observed billowing across the top surfaces of tailings dams in dry windy weather, there is a common misconception that the dust arises from wind erosion of the top surface. As a result, much effort and money is vainly spent on treating the tops of tailings dams to prevent dust generation, whereas the slopes of the dams are the true major dust source.

This paper briefly reviews what is known of erosion of tailings dams and then proceeds to describe the mechanics of wind erosion in general, and how it affects tailings dams in particular.

Finally, recommendations are made for mitigating wind erosion of tailings dams and the resulting blowing dust.


## Introduction

The Universal Soil Loss Equation[1] (USLE) has been used for many years to predict erosion losses from agricultural fields. The USLE identifies the most important parameters affecting erosion as slope length and slope angle. These, together with surface shear strength or hydraulic roughness have been confirmed as key parameters of erosion by observations and measurements of the erosion of the slopes of gold tailings dams in South Africa[2–4].

Figure 1a shows measurements relating slope angle to tailings loss by erosion, mainly for unprotected tailings slopes. The lateral spread of the data at a slope angle of about 1:1.5 (33°) arises because the experimental data were obtained from slopes having a variety of lengths. The measurements were made by driving steel pegs into the surface being monitored, on a 3 m × 3 m grid, to give a 4 peg × 4 peg array. The pegs were initially driven in so as to leave 50 mm protruding above the surface, and erosion losses/gains from the surface were assessed by periodically measuring changes of surface level relative to the top of each peg. Erosion/accretion was measured at 10 different gold tailings dams on the Witwatersrand.

The following points should be noted from Figure 1a:

- maximum erosion occurs at slopes of between 30° and 35°, a common slope for tailings dams in South Africa
- very little erosion occurs from slopes approaching vertical and
- near-horizontal surfaces (i.e. the top surfaces of tailing dams) erode very little.

There are also indications that grassed slopes and slopes covered by a gravel mono-layer, or mulch, erode less than slopes with no protection. The data shown in Figure 1a, and similar data for the variation of tailings loss with slope length enabled the ‘erosion rate surface’ (shown in Figure 1b) to be constructed. This surface shows that erosion rates increase with slope length and are low both at very flat and very steep slope angles. The ‘belly’ of the erosion rate ‘sail’ at intermediate slope angles represents the range of slope angles usually used for tailings dams, (25° to 35°), which thus usually have the worst possible slope angles for erosion losses.

The larger the surface strength of a slope, the lower the rate of erosion. Hence the effect of a varying surface strength would be like the wind on a spinnaker sail: it would move the erosion rate surface in (shear strength increasing) or out (shear strength reducing)

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relative to the erosion loss axis (or 'mast'). Alternatively, a separate erosion rate surface can be considered to apply for each value of surface shear strength or roughness. Protecting the surface of a slope by armouring it or covering it with vegetation, has a similar effect to increasing the surface shear strength, and therefore moves the 'sail' inwards, i.e. back towards the 'mast'. Research has shown that surface treatments that roughen a slope surface, such as a discontinuous layer of stone chips or rock fragments, also help to reduce erosion losses very considerably by dissipating the energy of water or wind moving over the slope[5].

Concerning the effects of surface treatments of various types, Table I gives a summary of the results of a large-scale erosion-mitigation test carried out on the outer slope of a gold tailings dam[4,6]. Eleven experimental panels were set up on the slope, each measuring 10 m wide by 20 m long (up the slope). Precipitation and erosion were measured on all of the panels by means of rain gauges and a 5 m × 5 m grid of steel pegs driven into the slope surface (3 pegs across the width by 5 pegs along the length). Measurements were taken at the end of the wet season (March) and the end of the dry season (September) over a period of 4 years. As Table I shows, it appears possible, with an appropriate surface treatment, to reduce the rate of erosion of a tailings slope to values that are even less than those for a natural hillside. However, a longer period of observation is required to make sure that the various slope covers are sustainable with a minimum of maintenance. Although all the above results were obtained from measurements on gold tailings dams, the principles are valid for tailings and tailings-like materials of other origins.

Figure 1 and Table I consider the effects of total erosion, i.e. the sum of that caused by water and wind. The early measurements shown in Figure 2 compare total erosion measured separately on unprotected gold tailings dams on the Witwatersrand for the summer (wet) and winter (dry) seasons[2]. (The erodibility index in Figure 2 is the COMET erosion index[7].) It is reasonable to assume that erosion occurring in the moist summer is mostly due to water, and that occurring in the dry winter, to wind. On this basis it will be appreciated that on the highveld, wind erosion can make up about half of total annual erosion, and can be a significant agent of the erosion of tailings dams. In drier climates, wind erosion probably becomes more important, and vice versa for wetter climates.

## Wind speed profiles, amplification factors and wind erosion

### *Variation of wind speed with height above ground level—the wind speed/height profile*

Wind arises from the movements of air masses across the surface of the Earth, which are powered by the solar energy received by the atmosphere. The fundamentals of this vast energy source, in relation to evaporation from tailings dams,

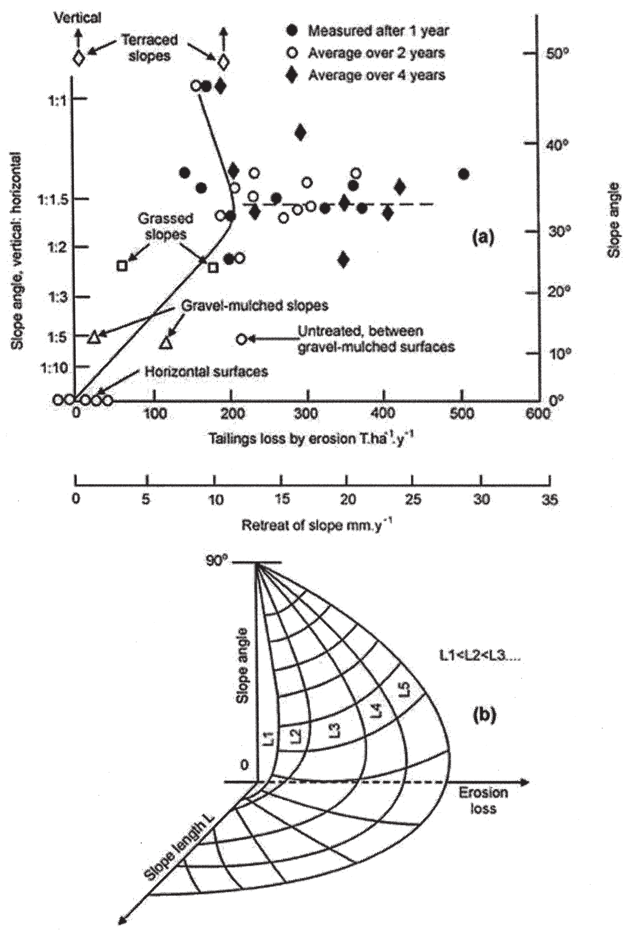


**Figure 1—(a) Data for the variation of tailings loss with slope angle for gold tailings dam slopes. (b) The erosion rate surface which relates slope length and angle to erosion loss and surface shear strength or roughness**

*Table I*

**Comparison of surface erosion rates of the slopes of gold tailings dams treated in various ways, with erosion of a natural slope**

| Description of slope | Cumulative rate of erosion measured over 4 wet seasons T/ha/y | Relative cost of treatment ha$^{-1}$% |
|---|---|---|
| Natural 20° hillside | 25 | – |
| 33° Tailings slope: Treatment | | |
| Untreated | 1000 | – |
| Grass (seeded) | 160 | 100 |
| Grass (sods placed on surface) | 45 | 110 |
| 100 mm layer: 50 mm single sized stone | 35 | 67 |
| 300 mm layer: run of mine waste rock | 12 | 62 |
| 300 mm layer: fine waste rock | 85 | 62 |
| 300 mm layer: fine waste rock on geofabric | 15 | 120 |

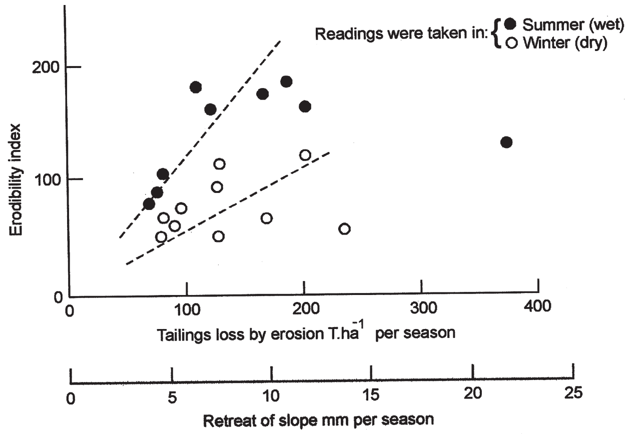


Figure 2—Observations of seasonal erosion losses that show wind erosion (dry season) to be a significant component of total erosion for tailings slopes on the South African highveld

have been set out by Blight[8,9]. As an air mass moves across the Earth's surface, its motion is retarded by friction between the moving air and the Earth's surface, taken to be stationary relative to the wind. As a result, the wind speed increases with height above the ground surface, according to the equation

$$u = u* \ln z / z_o \qquad [1]$$

where $u$ is the wind speed at height $z$ above the surface, $u^*$ is the wind speed when $1n\ z/z_0 = 1$ (i.e. $z/z_0 = 2.72$) and $z_0$ is a reference height.

Figure 3 shows two examples of wind speed profiles calculated from Equation [1] for $u^* = 5$ km/h and $z_0 = 0.2$ m and for $u^* = 5$ km/h and $z_0 = 0.5$ m. Wind speeds are conventionally measured at a height of 2 m above the surface. Considering the profile for $z_0 = 0.2$ m, the figure shows that if the wind speed at $z = 2$ m is 11.5 km.h$^{-1}$, it will be 27.5 km/h at a height of 50 m. The ratio of these two speeds (27.5/11.5 = 2.4) is called the wind speed amplification factor or simply the wind amplification factor (with the amplification factor at $z = 2$ m being 1.0). Figure 3 also shows the wind amplification factor curve for $z_0 = 0.2$ m.

### Erosion and transportation by wind

The ability of the wind to erode and transport particles increases with wind speed. According to Bagnold[10] the rate of movement of material increases with the cube of the wind speed at the surface. His classical equation is:

$$R = B(u - u_t)^3 \qquad [2]$$

The writer has found that an exponential relationship of the form

$$R = \exp(Au) - 1 \qquad [3]$$

also fits experimental wind transport data. In Equations [2] and [3],

$R$ is the rate of transport of material along the surface by the wind, in kg.h.km$^{-3}$

$B$ is a constant of proportionality with units of kg.h$^4$.km$^{-6}$

$u$ is the wind speed in km.h$^{-1}$

$u_t$ is a threshold wind speed at which surface material loses stability and starts to be transported

$A$ is a dimensionless factor.

$B$, $u_t$ and $A$ vary with the particle size distribution of the material being eroded and transported.

Figure 4 shows examples (to the same scale) of wind transport curves (a) for gold tailings and (b) for uranium tailings (coarser overall than the gold tailings). Figure 4c shows how the threshold speed $u_t$ increases as the material becomes coarser. In this figure, $D_{60}$ is the particle size such that 60% by mass of particles are finer than $D_{60}$.

### Wind speed profiles over natural and constructed slopes

Figure 5 shows a profile of wind speed amplification factor measured at a height of 0.1 m above the surface of a very large (117 m high) coastal sand dune (the mountain-climbing dune at Robberg, near Plettenberg Bay). Because sand dunes are formed by the wind, they offer the least resistance to wind movement, and the profile of wind speed over a dune corresponds in a general way to the elevation profile of the dune. In Figure 5, the elevational and wind speed amplification profiles are compared. The elevational profile has identical horizontal and vertical scales. Points to note are:

- ➤ Even a slight irregularity in the elevational profile can cause a significant response in the wind speed amplification factor profile. For example, the lee of the small slip face near the base of the dune (A in Figure 5) gives complete shelter from the wind and locally reduces the amplification factor to zero. Sand is transported up the slope and, where the wind speed reduces, is deposited at the top of the slip face, down which it slides. As the wind speed increases further up the slope, sand is once again picked up and transported towards the crest of the dune, ultimately to be deposited on the crest, whence, in periods of higher

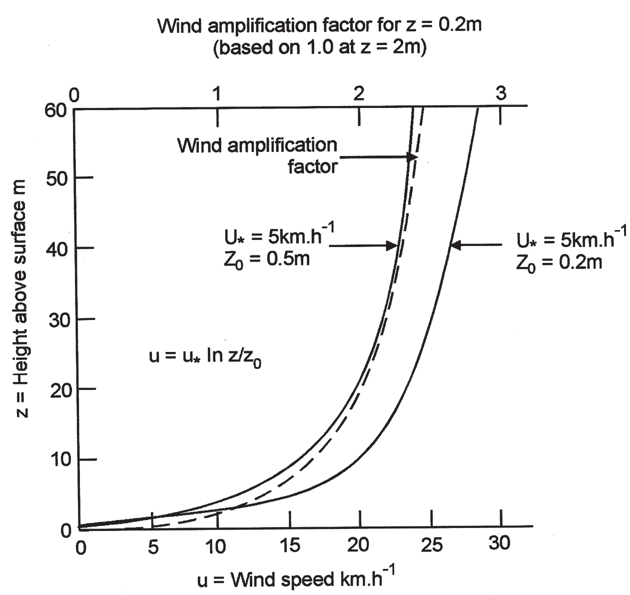


Figure 3—The wind speed profile over flat terrain

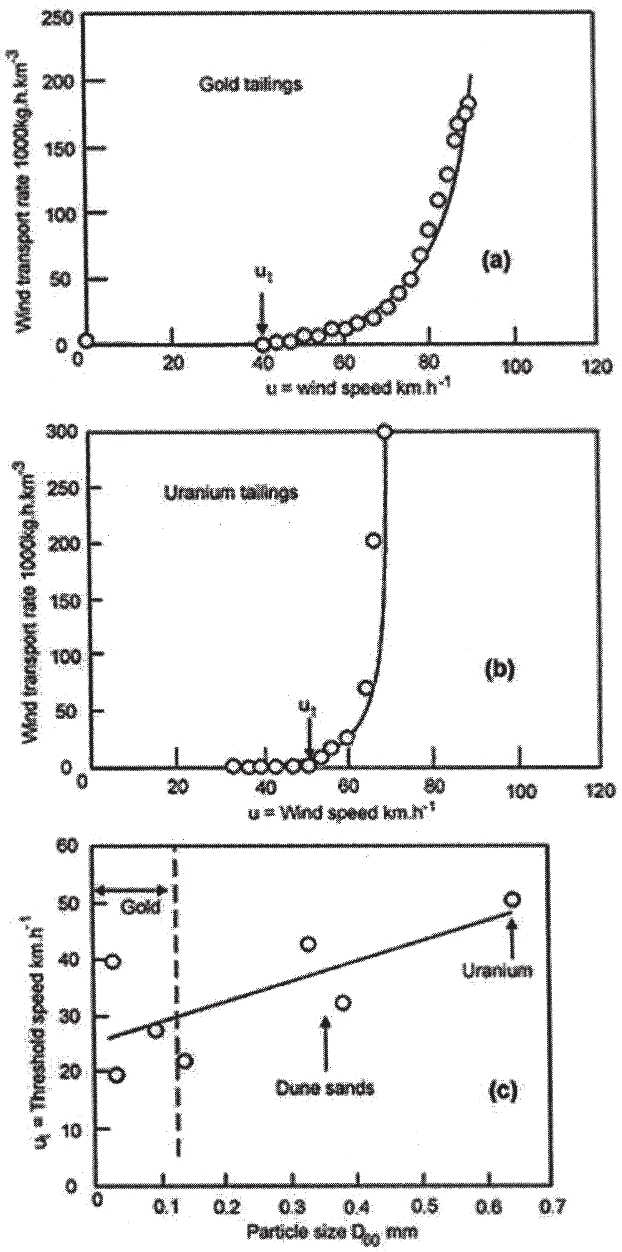


**Figure 4—Material transport by wind, (a) and (b) wind transport curves for gold and uranium tailings, respectively, (c) effect of $D_{60}$ particle size on threshold wind speed $u_t$**

wind speed, it is carried onto the final slip face and falls over a cliff into the sea.

➤ At any such irregularity, the wind amplification factor starts to reduce slightly before the irregularity is reached (e.g. at A, B and C on the elevational profile of the dune). In particular, the amplification factor reduces slightly before the elevational crest of the dune.

Figure 6 compares the wind speed amplification factor and elevational profiles for a tailings dam, identified as Dam No. 1. The amplification factor shows similar characteristic changes to those shown in Figure 5. At A, B, C, D and E, the amplification factor drops shortly before a reduction in slope angle occurs, and then starts to increase again. Even slight changes in slope such as those at C and F, reduce the amplification factor. A line of scrap earth-moving tyres placed experimentally near the crest of the slope at E reduces the amplification factor seemingly out of all proportion to the height of the obstruction. (However, the tyres would have been more effective if they had been placed at, or even upwind of the crest at D.)

Once the crest at F has been passed, the amplification factor becomes almost constant at 0.7. As with the natural dune, one would expect erosion of the surface to occur on the slopes before points A and B and, particularly, close upwind of D. Depending on the actual wind speed in relation to the threshold speed $u_t$ (Figure 4), deposition would be expected shortly beyond A, B, D and possibly E. Because of the low amplification factor over the top surface of the dam, wind erosion of the top surface would be minimal in comparison with that from windward slopes. However, during periods of exceptionally high winds, the reduced wind velocity across the top surface of a dam may still exceed the threshold velocity and result in erosion. Numbers of wind speed amplification profiles have been measured on tailings dams, and they all have very similar characteristics, especially in relation to the tops of the dams.

## Erosion and deposition by wind on tailings dams and corresponding particle size analyses

The above conclusions are further supported by the observations recorded in Figures 7 and 9. Figure 7 shows the patterns of erosion and deposition observed on gold tailings

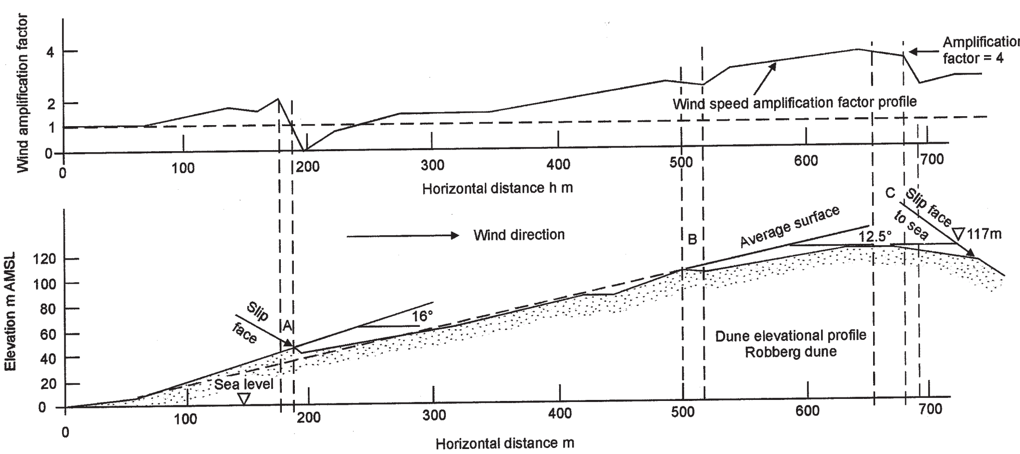


**Figure 5—Profiles of elevation and wind speed amplification factor (0.1 m above the slope surface) on a large mountain-climbing sand dune**

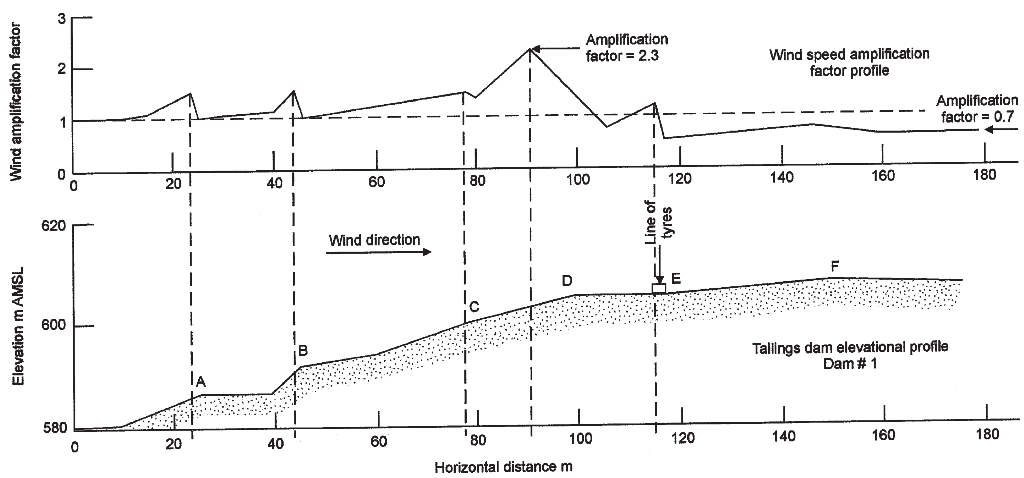


**Figure 6—Profiles of elevation and wind speed amplification factor (measured at 0.1 m above the surface) for a tailings dam slope (Dam No. 1)**

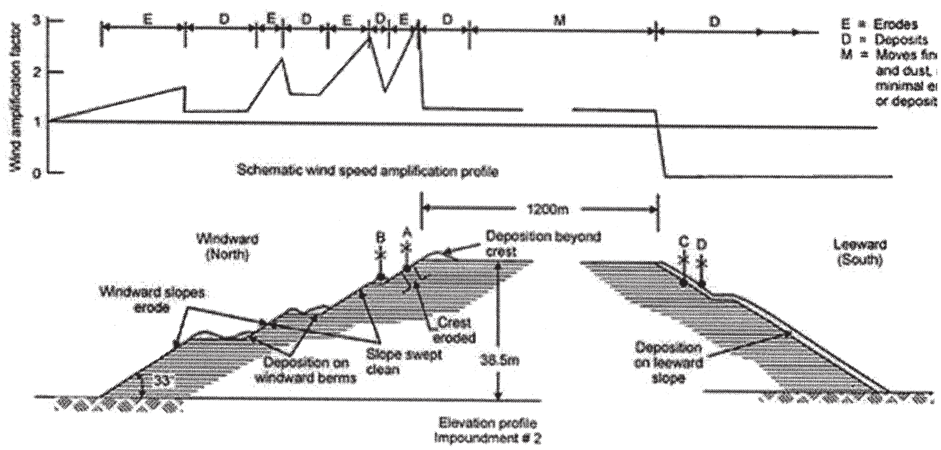


**Figure 7—Observed patterns pf erosion and deposition on a gold tailings Dam No. 2 after a period of dry windy weather. (Wind amplification profile is schematic, not measured**

Dam No. 2 after a period of dry windy weather during August/September on the highveld. It should be noted that the windward slopes (where the wind amplification factor is high) had been swept clean by the wind. Although the process could not be witnessed by eye, erosion of these windward slopes must have provided the loose material deposited on the windward berms and just beyond the windward crest as there is no other source for this material. The leeward slope, from the crest down, was completely covered by loose material deposited as the wind passed off the top of the dam and the amplification factor fell to zero in the lee of the dam. The top surface of the dam was also swept clean, but showed no signs of surface erosion.

Samples of the total tailings composing the original slope surfaces were taken at points A and C in Figure 7 and samples of the loose wind-deposited material were taken at points B and D. The particle size analyses for these samples are given in Figure 8. The analyses of the total tailings from points A and C were identical. The analyses for deposited material from points B and D were considerably coarser than the total tailings, with material from B (deposited on a windward berm) being slightly coarser than that from D (deposited on the leeward slope). If the analysis for the total

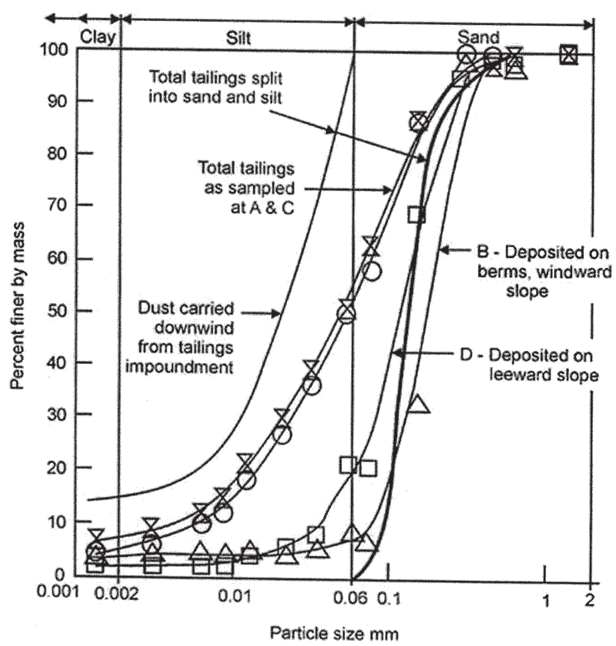


**Figure 8—Particle size analyses for samples taken from points A, B, C and D, marked in Figure 7**

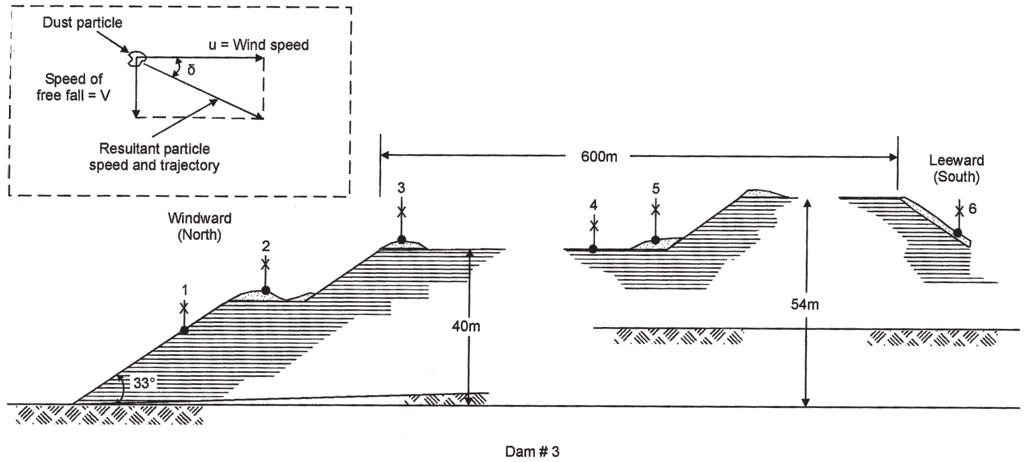


Figure 9—Patterns of erosion and deposition on a gold tailings Dam No. 3 after a period of dry windy weather. Inset diagram: trajectory of a failing dust particle blown by the wind (See Appendix )

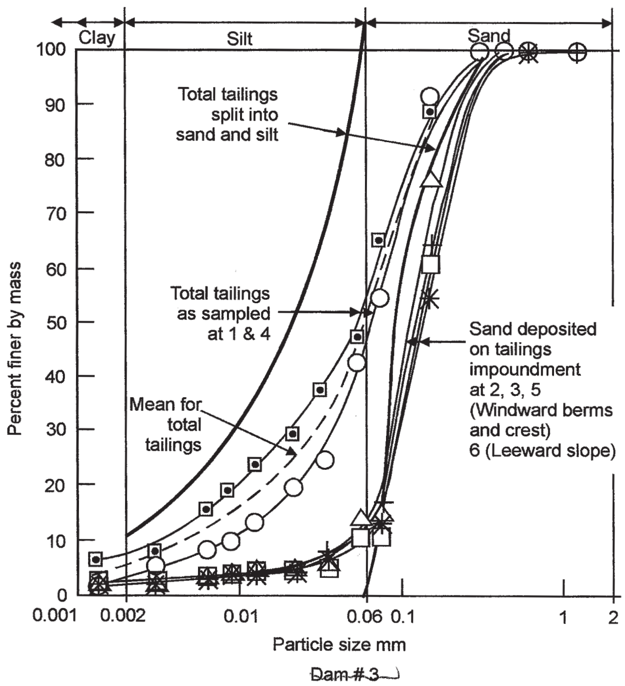


Figure 10—Particle size analyses for sample taken from points 1 to 6, marked in Figure 9

tailings is split into its sand and silt fractions (sand particles being those coarser than 0.06 mm), the grading of the sand is found to be very similar to that of the samples B and D. This indicates that the loose redeposited material (B and D) consists of total tailings with the silt sized particles winnowed out of it by the wind.

The patterns of erosion and deposition shown in Figure 9 for gold tailings Dam No. 3 (at a different mine about 20 km from Dam No. 2) are very similar to those shown in Figure 7, with windward slopes and top surfaces swept clean by the wind and loose material deposited on the windward berm and just beyond the windward crest. This pattern was repeated at the higher section of the dam to the south. Again, the leeward slope beyond the leeward crest was completely covered with loose material. Samples of total tailings were taken at points 1 and 4 in Figure 9, and of loose deposited material at points 2, 3, 5 and 6.

The results of particle size analyses carried out on these samples are shown in Figure 10. On Dam No. 3, the surface of the area where sample 4 was taken showed some signs of wind scouring and erosion. The area was not extensive and the erosion is thought to have been caused by wind eddies set up when the wind was blowing obliquely to the plane of the nearby slope. The analyses for the loose deposited material were all very similar in this case, and that for sample 4 was slightly finer than sample 1. Splitting the particle size curves into silt and sand fractions gave a very similar result to that shown in Figure 8. (The diagram inset on Figure 9 refers to the appendix to the paper which analyses the likely travel distance of dust particles of various sizes once the wind-borne dust blows clear of the tailing dam.)

The observations and results of particle size analyses for Dams Nos. 2 and 3 confirm the conclusions drawn from the amplification factor profile for Dam No. 1 and observations of other amplification factor profiles for tailings dams and natural sand dunes.

## Wind tunnel tests on tailings dam models

A series of wind tunnel tests has been conducted to explore the effects on the wind speed amplification profile over model tailings dams of various features such as windward and leeward slope angles, the presence of crest walls and berms, etc.

In a wind tunnel, the model dam represents an obstruction to the air which would otherwise flow at approximately uniform velocity along the tunnel. Because of the small scale, the 'natural' wind speed profile of Figure 3 cannot develop, although frictional retardation of the air does occur close to the walls of the tunnel. The wind tunnel is thus not a perfect representation of the situation in the field, but can nevertheless give valuable information on the effects of changing a dam's sectional geometry on air flow over the dam.

### Wind tunnel tests on model tailings dam sections

Figure 11a describes the air flow over a model tailings dam with a windward slope of 45° and no crest wall. The model was truncated by a vertical leeward slope. The figure shows contours of amplification factor measured on the model profile. The diagram clearly shows the increase in wind speed up the windward slope, the maximum wind speed at the crest and the reduced wind speeds (i.e. amplification factors of less than one) over the horizontal top surface. The contours show that having increased to an amplification factor of 1.8 at the crest, the wind stream overshot the crest, leaving the area beyond the crest in relative calm. In particular, the amplification factor close to the top surface of the dam was less than unity, and hence the top surface, beyond the crest, would have been protected from wind erosion.

Figure 11b shows that the introduction of a crest wall has the effect of further sheltering the horizontal top surface immediately in the lee of the crest wall, and of elevating the amplification factor contours above the horizontal top surface of the dam. The diagram shows the very considerable benefits of having an erosion-resistant crest wall to deflect the airflow upwards.

Figure 12 shows the relationship between the amplification factor at the crest of the windward slope and the slope angle. Purely from the aspect of wind erosion, it is clearly advantageous to adopt as flat a windward slope as possible, because the maximum amplification factor for the slope increases linearly with slope angle. For example, increasing the slope angle from 20° to 35° increases the amplification factor at the crest from 1.25 to 1.6, an increase of 28%. Even more importantly, for an approach wind of 30 kmh$^{-1}$, the speed of the wind striking the crest of the slope will increase from 38 kmh$^{-1}$ to 48 kmh$^{-1}$. If one is dealing with an unprotected gold tailings surface, from Equation [3]

$$R = \exp(5 \times 10^{-5} u) - 1 \qquad [3a]$$

Taking $A = 5 \times 10^{-5}$ for gold tailings, with $R$ in kg.h.m$^{-3}$ $R$ may almost double from 5.7 kg.h.m$^{-3}$ to 10 kg.h.m$^{-3}$.

### Wind flow over the top surface of a tailings dam

Figure 11a demonstrates that the upward deflection of the wind as it reaches the crest of a slope provides shelter for the horizontal or near horizontal surface of a tailings impoundment. However, as most tailings impoundments are several hundreds of even thousands of metres across, it can be argued that this sheltering effect may be relatively localized. Alternatively, as stated earlier, even if the approach wind speed is reduced by a factor of 0.8 or 0.7, high winds may still be sufficiently high over the top surface of a dam to cause wind erosion from the top. Low (1m) windrows of waste rock across the direction of the prevailing wind in the dry season or even ridge ploughing are often used as a measure intended to limit erosion of dam top surfaces.

Figure 13 shows contours of wind speed amplification factor for air flow over two adjacent model windrows. The leading windrow could represent the crest wall of a dam or the first of a series of parallel windrows. The spacing in Figure 13 of 8.5 times the windrow height represents the maximum that was possible in the wind tunnel used for the model tests.

The contours show very similar characteristics to those illustrated by Figure 11b. The contours are close to parallel to the surface and the wind speed close to the horizontal surface was negligible. Figure 13 also shows that windrows do not have to be closely spaced to protect a surface from wind erosion. The maximum spacing has not been

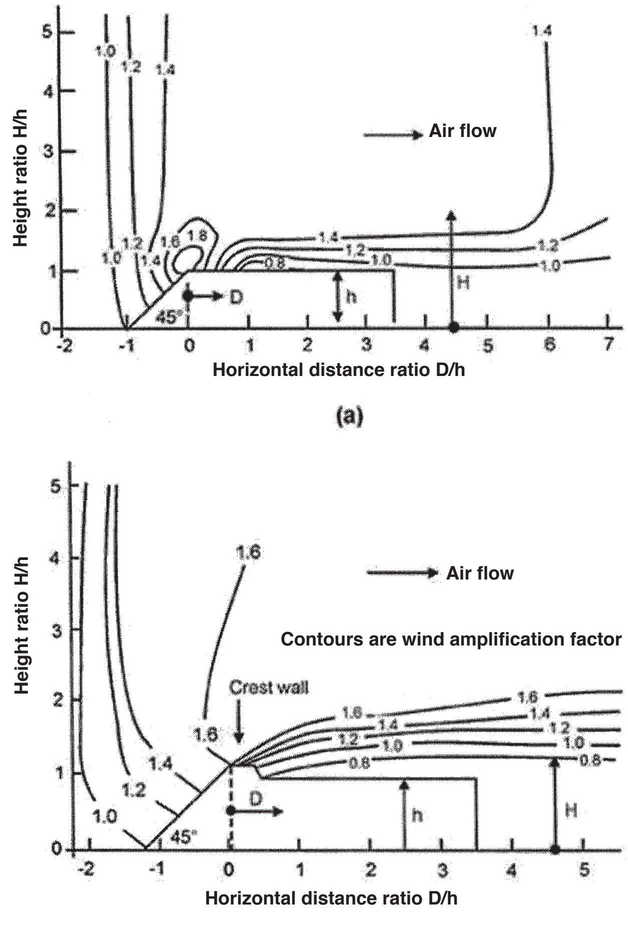


**Figure 11—Wind speed amplification factors observed in with tunnel tests on model tailings dam sections (a) 45° slope without crest wall, (b) 45° slope with a crest wall**

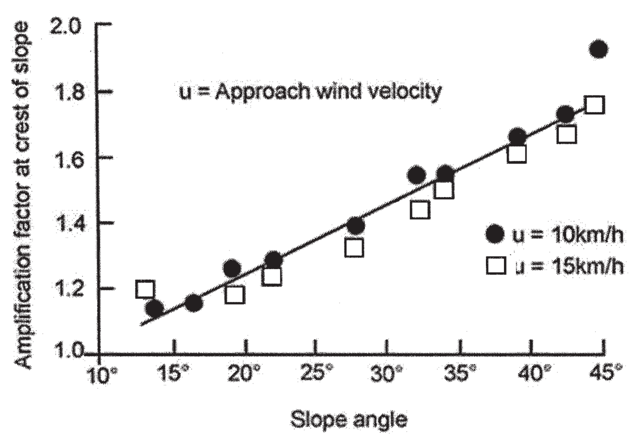


**Figure 12—The effect of slope angle on the wind speed amplification factor at the crest of the slope (no crest walls)**

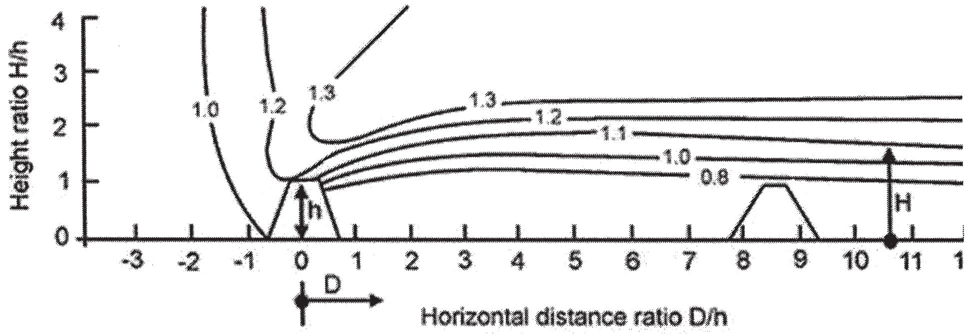


**Figure 13—Contours of wind speed amplification fafctor for air flow over model windrows**

established, but spacings of 10 or more windrow heights will clearly give good protection. Because major wind directions vary from season to season, windrows should be zig-zagged to provide protection for a range of wind directions. The angles for the zig-zagging are best established from a wind rose for local wind directions. This information is available from meteorological offices.

Hence, within their limitations, the wind tunnel tests, as well as the data in Figure 1a and the observations recorded in Figures 7 and 9 all support the contention that wind erosion of the top surfaces of tailings dams will be small, except in conditions of unusually high wind. Erosion will be greatest from the windward slope of a dam.

## Conclusions

- The results of measurements undertaken over a period of 4 years on the surfaces of 10 gold tailings dams in the 1980s (9 unprotected and 1 grassed) show that erosion of the near-horizontal top surfaces of the dams is small in comparison with that from the surrounding slopes. (Figure 1a).
- Measurements of seasonal erosion show that erosion occurring in the wet season (summer) can be about twice the erosion occurring in the dry season (winter). The fact that erosion continues to occur in winter when there is little rain indicates that wind erosion is an important component of total annual erosion. (Figure 2).
- *In situ* measurements of wind speed amplification profiles on tailings dams show that the highest wind speed amplification occurs just upwind of the windward crest, and that features such as berms and flattening of the slope angle provide protection from the wind. The amplification factor over the horizontal top surface of a dam is relatively low. (Figure 6).
- It follows that the upper windward slopes, and particularly the area just below windward crests are most susceptible to wind erosion. The top surfaces are less susceptible to significant wind erosion.
- Observations of deposition patterns of tailings eroded by the wind (Figures 7 and 9) support conclusions 3 and 4.
- Particle size analyses of samples of total tailings taken from the originally deposited material and from loose eroded material deposited by the wind in areas protected from the wind (Figures 8 and 10) show that total tailings eroded from the windward slopes and re-deposited by the wind in sheltered areas, consists of sand from which the silt fraction has been winnowed. It can be inferred that the silty material has been carried downwind as the clouds of dust that cause a dust nuisance downwind of the tailings dam. This conclusion is supported by the simple calculations of particle travel distance given in the appendix to this paper.
- Wind tunnel tests on model tailings dams (Figure 11) are in general agreement with field observations and measurements.
- The wind tunnel tests demonstrate the advantages of using flatter slope angles (Figure 12) and of lining the crest of a tailings dam with a substantial crest wall that is resistant to wind erosion. (Figure 11b).
- The wind tunnel tests also demonstrate the protective action of windrows placed across the top surface of a dam at extended intervals (Figure 13) to protect against the erosive effects of particularly high wind speeds.
- It is usually not necessary to protect the lower slopes of a tailings dam against wind erosion, but the upper slopes should be protected. At present rock armouring (see Table I) appears to provide the most cost-effective, long lasting and physically effective protection, not only against wind erosion, but also against water erosion.
- Apart from providing a substantial erosion-resistant crest wall, and a few widely spaced erosion-resistant windrows to guard against extreme wind conditions, it is not necessary to protect the near-horizontal top surfaces of tailings dams against wind erosion.

## Acknowledgement

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## Appendix

### *A note on the travel distance of blowing tailings particles*

The diagram inset on Figure 9 illustrates the dynamics of an isolated airborne particle of tailings blown by wind. The particle is assumed to be dragged and carried at a horizontal speed $u$ equal to that of the wind, and to be falling at a vertical speed $v$ given by Stokes's law. According to Stokes's equation, the falling velocity would be

$$v = \gamma_s d^2 / 18\eta \qquad [4]$$

where $\gamma_s$ is the solids unit weight of the particle, taken as 26.5 kN.m$^{-3}$ = 26.5 kPa.m$^{-1}$
$d$ is the equivalent particle diameter in mm and
$\eta$ is the viscosity of air, taken as 1.5 $\times$ 10$^{-8}$ kPa.s = 4.1 $\times$ 10$^{-12}$ kPa.h

$$\text{Hence } v = 360 d^2 \text{km.h}^{-1} \text{with d in mm} \qquad [4a]$$

If $d$ = 0.06 mm (the dividing size between silt and sand), $v$ = 1.3 kmh$^{-1}$, or 0.36 ms$^{-1}$.

Suppose that the wind speed at the surface is 50 km.h$^{-1}$ (13.9 ms$^{-1}$) and that a grain of diameter 0.06 mm is projected into the air by the wind, to a height of 1 m. It will then simultaneously be travelling at a horizontal speed of 13.9 ms$^{-1}$ and falling at a speed of 0.36 ms$^{-1}$. It will take 2.75 s to fall to the surface, and in that time will travel a distance downwind of 38 m. If it continues to saltate in this way, it will cover a distance of 1 km in 26 saltations, making 26 impacts on the surface, on its way. Once it reaches the leeward edge of the impoundment (in 16 saltations in the case of impoundment No. 2), it will fall into the calm air downwind of the edge, its vertical velocity will be unchanged, its horizontal velocity will reduce rapidly and it will be deposited onto the leeward slope.

For a particle of diameter 0.006 mm, the falling velocity will be 0.0036 ms$^{-1}$ and the distance of each 1 m high saltation will increase from 38 m to 3800 m. Hence once a particle as small as this has been projected into the air, even to a distance of only 1 m above the surface, it will effectively remain air-borne. ◆

# A new beginning for UCT Chemical Engineering Students thanks to the SAIMM Scholarship Fund

Due to the generosity of the SAIMM Scholarship Fund, 14 Chemical Engineering students in both 2005 and 2006 at the University of Cape Town were able to receive various levels of support for their goals of studying towards their degree in Chemical Engineering. The difference that this scholarship has made in the lives of the recipients cannot be underestimated. In the words of just one of the 2005 recipients, Mr Sonwabo Vena: 'Coming from an underprivileged background but having a good learning ability can be a very daunting experience. Good education comes at a high price and when you do not have the funds to maintain it, the cost can be very stressful to one's learning and lifestyle… Being the fourth child of four children at home, I was worried about how I was going to pursue my studies due to financial constraints… but when I heard that I had received the SAIMM scholarship, I felt that I had been given a 'new beginning'. The scholarship took away some of the financial strain on my family and also gave me peace of mind so that I could concentrate on my studies.'

The UCT recipients of the 2005 SAIMM scholarships were: Mr Sonwabo Vena and Mr Sanele Gumede, both first year Chemical Engineering students, Mr Luqmaan Salie, Mr Zamier Kahn, Mr Senzo Xulu and Ms Muneera Deaney, all from the department's second year class, and Ms Mokete Letsoalo from the third year class.

These students come from a range of backgrounds but are all imbued with enthusiasm for the impact that they can make as chemical engineers in the mining industry in South Africa. The award served not only to help ease the financial burdens of the recipients but also engendered interest in pursuing careers and projects in the mining and metallurgy field. Ms Mokete Letsoalo is currently involved in a fourth year project investigating the flotation performance of a copper ore under the supervision of Associate Professor Dee Bradshaw as a direct result of her involvement in this scholarship programme, which sparked an interest in this field. Some words of gratitude from Ms Letsoalo: 'I'm currently in my final year in Chemical Engineering at UCT and it was great to receive the scholarship because my mom

Ms Mokete Letsoalo pictured here in the Mineral Processing laboratory doing her fourth year project

The UCT 2006 SAIMM scholarship award holders (from the left) Ms Leigh Pearce, Ms Linda Kotta, Mr Melikhaya Ndingane, Mr Sinetemba Nkukwana, Ms Rido Rambau, Ms Cindy-Lee Smith, Mr Sonwabo Vena, Ms Nabathembu Mangesana and Associate Prof. Dee Bradshaw

(widowed) would have had difficulties paying my fees… It was great that I could therefore concentrate on my studies to ensure that I graduate at the end of this year and I now also am considering looking for a career in the mining indusry'.

This year the seven UCT recipients of the SAIMM scholarships are: Mr Melikhaya Ndingane, a second year Chemical Engineering student converting from a BSc, Mr Sonwabo Vena, currently in the second year class, and Ms Cindy-Lee Smith, Ms Rido Rambau, Ms Leigh Pearce, Ms Nabathembu Mangesana, Mr, Sinetemba Nkukwana, all members of the third year Chemical Engineering class. The scholarships were awarded by Associate Professor Dee Bradshaw and first year lecturer Linda Kotta during a lunch-time ceremony held in the Department of Chemical Engineering on Monday 9 October 2006. The 2006 SAIMM scholarship recipients recognize that the mining industry is closely linked with the economic growth and future of South Africa and realize that a career in the mining industry on the whole is, in the words of 2006 recipient Ms Leigh Pearce: 'tremendously diverse, rich in opportunity and an exciting vocation to pursue.'

In conclusion, 2005 recipient Ms Muneera Deaney aptly sums up the gratitude for the financial relief that the SAIMM scholarship has provided for all award holders in both 2005 and 2006: 'My father is holding down two jobs in order to make ends meet. His children's education is obviously very important as, due to being previously disadvantaged, he was unable to study in his own country and was forced to study in Egypt, sacrificing 10 years away from his own family… I am utterly grateful that there was a way in which it was possible for me to make the financial burden on my family a bit lighter. Thank you SAIMM for helping to make the road that I am travelling smoother!' ◆

**Larry Cramer**
*Scholarship Trust Fund Chairman*