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DUST DEVILS AND OTHER SMALL WHIRLWINDS

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Professor Businger of the Department of Atmospheric Sciences, University of Washington, Seattle, enunciated the conditions favourable for the formation of dust devils as strong heating from below, light to moderate winds and a dry dusty surface. Under these conditions turbulence is generated both by wind shear and buoyancy. It seems surprising that when the lowest layers of the atmosphere are most chaotic and turbulent, that such a remarkably stable structure as a dust devil does develop. The precise mechanism of these whirlwinds is still largely unknown.

Some specific observations have been made concerning the sense of rotation, size, duration and frequency of occurrence. Although there is still some controversy about whether or not cyclonic rotation is more frequent than anticyclonic rotation, there is no doubt that both senses of rotation do occur. A large number of dust devils, observed in Arizona, seem to indicate that each sense of rotation is about equally frequent. The visible diameter of a dust devil may vary from 50 cm to 50 m, the height may extend from a few metres to several thousand metres, and its duration may vary from a few seconds to one or two hours. Over water, when extremely cold air blows over relatively warm water, phenomena similar to dust devils may be observed, which could be called steam or fog devils and which seem to possess altogether similar characteristics.

Good observations of wind, temperature and pressure distribution are very difficult to obtain and consequently scarce. The horizontal tangential wind of a well developed whirl may be 20 m sec^{-1} with a corresponding pressure drop of 3 mb in the centre. The vertical velocity appears to have a maximum near the maximum of tangential velocity. The strongest updraft therefore forms a cylindrical surface. In the centre of this cylinder, e.g. the centre of the vortex, the updraft is very weak and often even a downdraft may be observed.

Besides a general description of available observations, some theoretical efforts to understand the phenomenon were mentioned. Although a good theoretical description of a uniform steady state and also of a uniform decaying vortex may be given assuming a simple convergence pattern, there still remain two major problem areas to be solved.

- (a) What is the structure of the interaction of the vortex with the surface?
How does the vortex maintain its vorticity?, and
- (b) What is the stability of the vortex flow?

It is apparent that near the centre the flow is rather stable and perturbations seem to damp but there must be a radius beyond which the flow becomes unstable and turbulence sets in.

The importance of the study of dust devils may be limited, but it is felt that a good understanding of the phenomenon may be a considerable help to a better understanding of more spectacular phenomena like the tornado, the hurricane, or even to some aspects of the origins of the solar system.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes that proper record-keeping is essential for ensuring transparency and accountability in financial operations. This section also outlines the various methods and tools used to collect and analyze data, highlighting the need for consistency and precision in data entry and reporting.

2. The second part of the document focuses on the implementation of internal controls and risk management strategies. It details the process of identifying potential risks and developing effective mitigation plans to minimize their impact on the organization. This section also discusses the role of internal audits in monitoring and evaluating the effectiveness of these controls, ensuring that the organization remains compliant with relevant regulations and standards.

3. The third part of the document addresses the importance of communication and collaboration in achieving organizational goals. It emphasizes the need for clear and concise communication channels, both internally and externally, to ensure that all stakeholders are informed and aligned with the organization's mission and vision. This section also discusses the role of teamwork and collaboration in driving innovation and improving overall performance.

4. The fourth part of the document discusses the importance of continuous improvement and learning. It emphasizes the need for organizations to regularly evaluate their processes and procedures, identifying areas for improvement and implementing changes to enhance efficiency and effectiveness. This section also discusses the role of training and development in building a skilled and motivated workforce, capable of adapting to changing market conditions and technological advancements.

5. The fifth part of the document discusses the importance of ethical and social responsibility in business operations. It emphasizes the need for organizations to operate in a transparent and ethical manner, prioritizing the interests of all stakeholders and contributing positively to society. This section also discusses the role of corporate social responsibility (CSR) in building a strong and sustainable brand, and the importance of reporting on CSR activities to stakeholders.