Chapter 1: Waste Engineering, Characteristics of Mine Wastes and Types of Waste Storage

- The nature and magnitude of the mine waste storage activity
- Origins and quantities of mine waste
- The effects of climate
- Waste characteristics
- Principles of mine waste management
- Types of mine waste storage
- Philosophy and arrangement of this book

Chapter 2: Selection of a Site for Storage of Mine Waste

- Procedure for site selection
- Preliminary assessment of required size of site
- Possible fatal flaws in candidate sites
- Seeking and obtaining public acceptance
- Preliminary ranking of candidate sites
- Site feasibility study
- Risk analysis
- Environmental impact report
- Preliminary geotechnical characterization of waste
- Preliminary site investigation
- Final site selection
- Examples of disastrous selection of sites

Chapter 3: Geotechnical Exploration of Sites for Development of Mine Waste Storages

- Soil engineering survey
- Soil engineering data
- Detailed information for design of slopes & seepage control
- Profile description
- Simple in situ tests and soil sampling
- Taking undisturbed soil samples for laboratory testing

Chapter 4: Environmental and Engineering Characteristics of Mine Waste, Including Stress and Strain Analysis and Laboratory Shear Testing

- Characteristics having environmental impact
- Engineering characteristics
- Changes of waste characteristics with time, and other considerations
- Analysis of stresses and strains and the principle of effective stress
- The behaviour of mine waste materials subjected to shear
- The process of consolidation and pore pressure redistribution in laboratory shear tests
- The strength and viscosity of tailings at large water contents
- The shear strengths of interfaces
- The shear strength of waste rock
- Strain softening of "dry" coarse mine wastes
- The mechanics of unsaturated waste materials

Chapter 5: In Situ Shear Strength Testing of Tailings and Other Waste Materials and Test Interpretation

- The shear vane test
- The pressuremeter test
- The cone penetrometer test
- Estimation of potential for liquefaction from cone penetration tests

Chapter 6: Measuring the Coefficient of Permeability in the Laboratory and In Situ, Seepage Flow Nets, Drains and Linings, Geosynthetics, Geomembranes and GCL’s

- Measuring permeability
- Observed differences between small scale and large scale permeability measurements
- Laboratory tests for permeability
- Methods for measuring permeability in situ
- Estimation of permeability from field tests
- Large-scale permeability tests using test pads
- The permeability of tailings
- Seepage and flow nets
- The design of filter drains
- Calculation of seepage rates through tailings storages
- The processes of consolidation and pore pressure redistribution
- Basal impervious liners and surface cover layers
- Blockage of filter drains and geotextiles
- Geosynthetic materials

Chapter 7: The Mechanics of Compaction

- The compaction process
- Uses of compaction in mine waste engineering
- The mechanisms of compaction
- Relationships between saturated permeability to water flow and water content
- Laboratory compaction
- Precautions to be taken with laboratory compaction
- Compaction in the field
- Designing a compacted clay layer for permeability
- Seepage through field-compacted layers
- Control of compaction in the field
- Special considerations for work in climates with large rates of evaporation
- Additional points for consideration

Chapter 8: Methods for Constructing Impounding Dykes for Storing Hydraulically Transported Tailings and Other Fine-Grained Wastes

- Deposition methods and sequences
- Beach formation in hydraulic deposition of fine-grained wastes
- Predicting beach profiles
- Details of particle size sorting during hydraulic deposition
- Effects of particle size sorting on permeability, water content and strength variation down a beach
A comparison of tailings beaches formed in air and in water
Methods for depositing slurries of tailings and other fine-grained waste materials
Operational systems for tailings storages
An example of building an embankment by underwater deposition
Pool control and decanting

Chapter 9: Water Control and Functional and Safety Monitoring for Hydraulic Fill Tailings Storages and Dry Dumps Safety Appraisal Special Considerations for Carbonaceous and Radioactive Wastes

- Basis of a water control system
- Penstocks or decant towers and spillways
- Monitoring systems for waste storages
- Appraisal of safety for waste storages
- Special considerations for carbonaceous wastes
- A note on characteristics of radioactive wastes

Chapter 10: Water Balances for Tailings Storage Facilities and Dry Waste Dumps

- Water balances in general
- Required data
- Components of the water balance for an operational tailings storage
- Examples of water balances for operating hydraulic fill tailings storage impoundments
- The possibilities for saving water
- Seepage from the tailings storage into the foundation strata and the recession of the phreatic surface following cessation of operations
- Drainage of interstitial water as the phreatic surface recedes
- The water balance for a “dry” dump or a closed and rehabilitated tailings storage
- Measuring potential infiltration and runoff
- Estimating evaporation or evapotranspiration
- Measuring evaporation by solar energy balance
- Depth to which evaporation extends
- The effects of slope angle and orientation on solar radiation received by slopes of waste storages
- Water balances for "Infiltrate, Store, Evapotranspire" (ISE) covers and for impervious cover layers on mine waste storages
- The water balance for a dry ash dump
- Disposal of industrial waste liquids by evaporation and capillary storage in waste
- The role of soil heat G in evaporation of water from a soil

Chapter 11: Failures of Mine Waste Storages

- Failures: causes, consequences, characteristics
- Failures of hydraulic fill tailings storages caused by seismic events
- Flow failures caused by overtopping
- Failure caused by increasing pore pressure
- Failures caused by excessive rate of rise
- Failure caused by poor control of slurry relative density
- Post-failure profiles of hydraulic fill tailings storages

Chapter 12: Surface Stability of Tailings Storages Slopes – Erosion Rates, Slope Geometry and Engineered Erosion Protection

- Past practice for slope angles of tailings storages
- Acceptable erosion rates for slopes
- Wind erosion compared with water erosion
- Acceptable slope geometry for tailings storages
- Protection of slopes against erosion by geotechnical means
- Special considerations applying to badly eroded abandoned or neglected tailings storages
- The effect of eroded tailings on the surroundings of a storage of sulphidic tailings
- Wind speed profiles, amplification factors and wind erosion
- Wind speed profiles over natural and constructed slopes
- Wind tunnel tests on model waste storages
- Erosion and deposition by wind on full size waste storages
- Analysis of particle movement in the wind
- Summary of points to be considered

Chapter 13: The Use of Mine Waste for Backfilling of Mining Voids and as a Construction Material

- Applications of backfilling
- Backfilling of shallow underground mine workings to stabilize the surface
- The properties of mine waste as a structural underground support in narrow stopes
- Measurements in situ of stresses and strains in fills at great depth
- Supporting narrow stopes with steel-reinforced granular tailings backfill
- The behaviour of steel mesh-reinforced square columns of cemented cyclone tailings underflow (grout packs)
- The use of geotextiles for temporary retention of backfill in narrow stopes during hydraulic placing
- The use of mine and industrial wastes in surface construction