

eThekweni STTA- Ferromanganese Project

Permitting Process for Assmang-CatoRidge and Key Issues

May 2009



A Process of Engagement



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Specific Problem

- South Africa has many ferromanganese and primary steel foundries
- There is a limited scope for and approach to the regulation and permitting of ferromanganese foundries.
- Specific environmental health issues relate to:
 - Emissions of heavy metal laden particulate matter into the air, water and soil media
 - Emissions of toxics such as PAH and dioxins
 - Poor materials handling and wastewater handling processes
 - Inadequate process control that causes incidental emissions to the receiving environment
 - Occupational health implications

Main Output

- An integrated SCHEDULED TRADE PERMIT/EMISSION LICENCE with a manual to guide regulatory personnel in government administration.

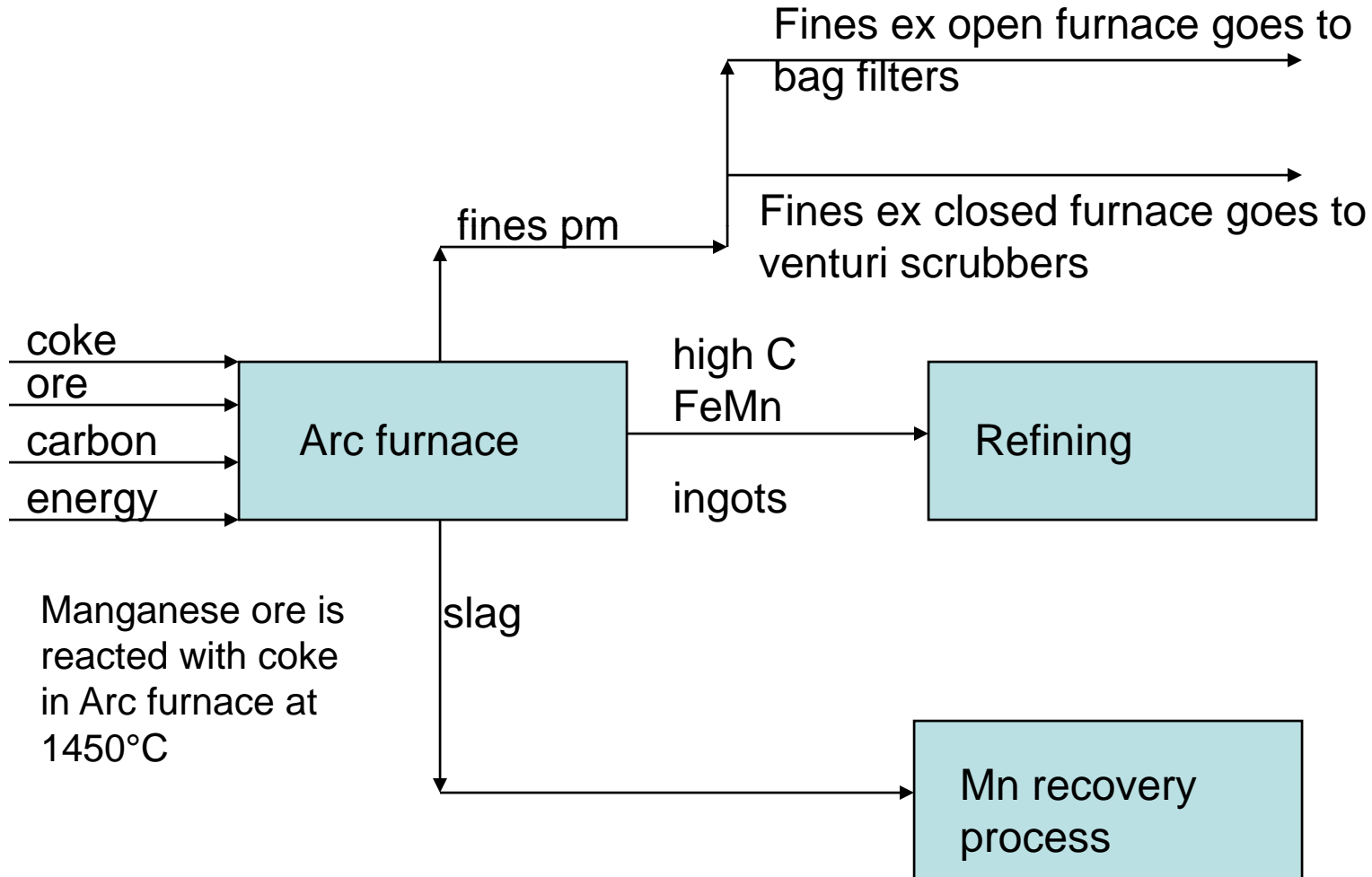
Sub-outputs

- Process assessment framework.
- Emission reporting framework
- Protocol for monitoring and sampling for the sector (a ferromanganese foundry)
- Prescriptions for the setting of emission limit values
- Process-environmental control options to minimise impact on the environment
- CASE study of EIA consideration

Existing Data

- Operation started 1956, furnace 1, 2 in 1959
- Original furnace decomm in 1990 due to pollution
- Furnace 1, 2 rebuilt in 1997
- Best Mn alloy producer in the world, 49 % Mn in ore
- Reductants = coke and anthracite
- Technology = submerged furnace
- Production = 235 000 tpa
- High carbon Fe Mn → ingots
- 700 employees
- Mn is used to reinforce steel products

Brief Process Outline



Properties of Mn

Synonyms	Manganese	Manganese dichloride	Manganese sulfate	Manganese II & III oxide
Chemical Formula	Mn	MnCl ₂	MnSO ₄	MnO ₂
Colour	Grey white	Pink	Pale rose red	Black
Uses	Strengthen steel, paint pigment	Steel Production Catalyst	Fertilizer	Production of dry batteries

Environmental Health issues

Air quality, Occupational Health, MHI

Air Quality

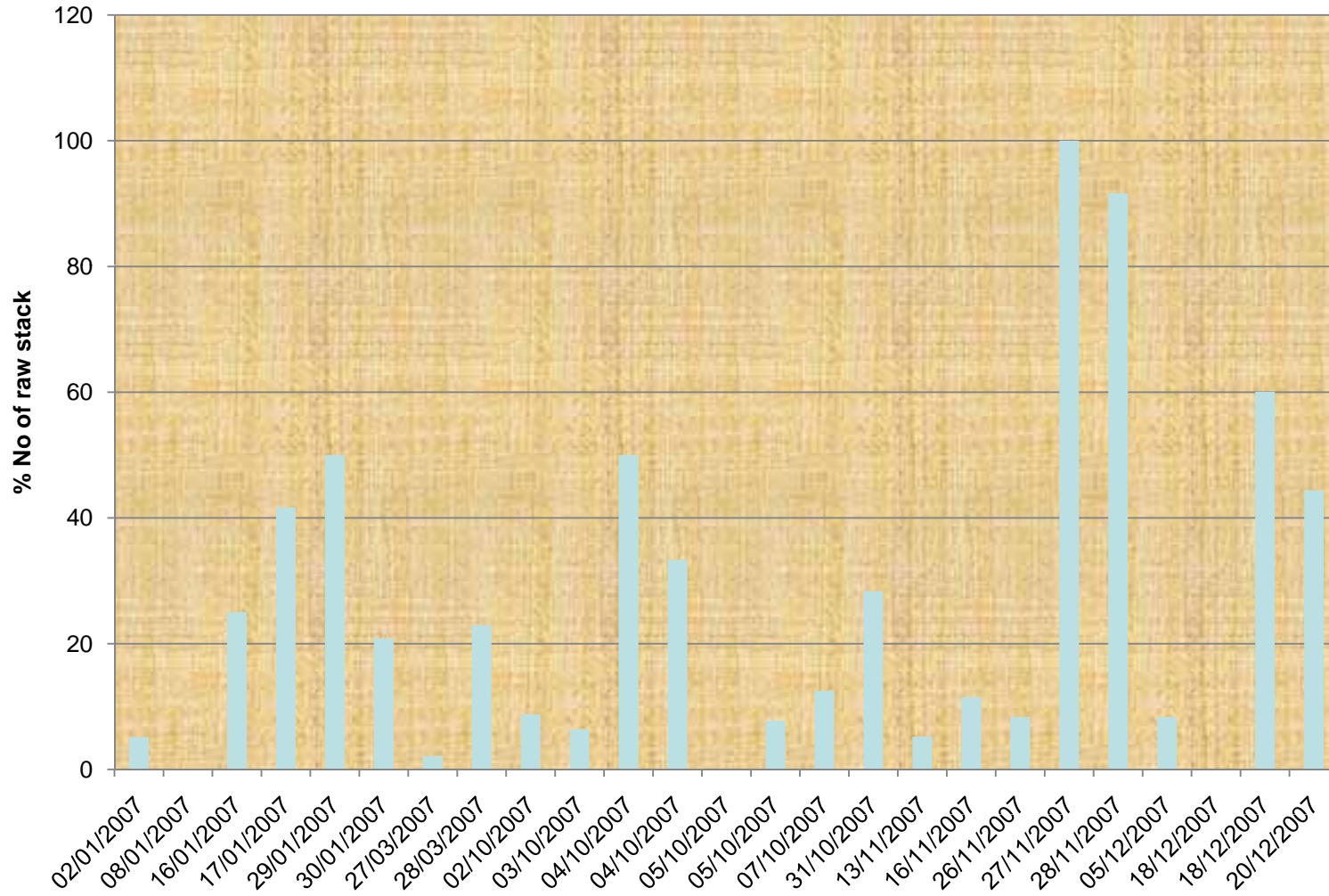
- Air pollutants identified include :CO, Mn fumes, Mn dust welding fumes, total dust,
- Sources of pollution (6 furnaces, raw material stock piles, slag dump).
- A full emissions inventory detailing all emissions sources, total emissions / annum, fugitive emissions was called for.
- Details of all control measures in place should be supplied.

Air Quality Focus

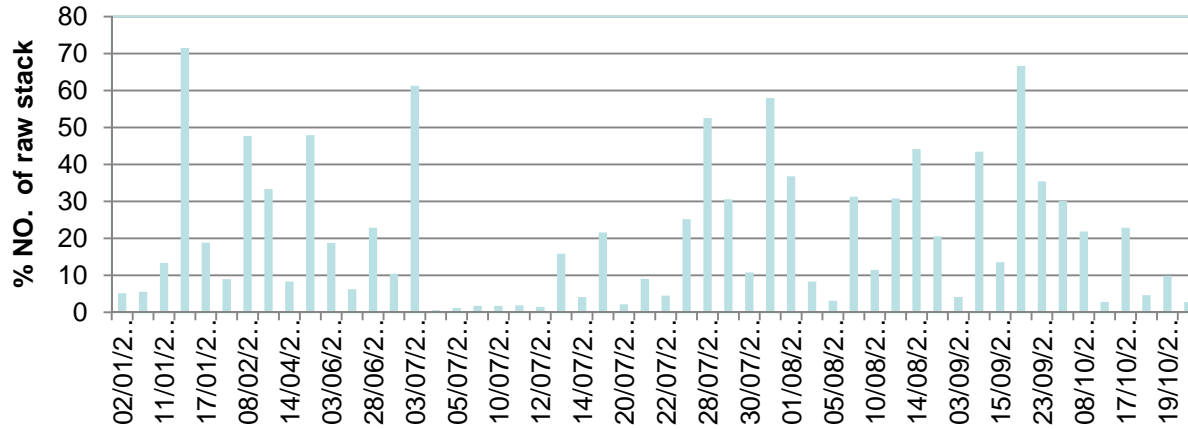
- **Dust Fallout**
(Traditional focus)
- Expanded Focii
 - PM_{10}
 - $PM_{2.5}$
 - VOC
 - PAH's
 - SO_2
 - NO_x
 - Mercury (Hg)



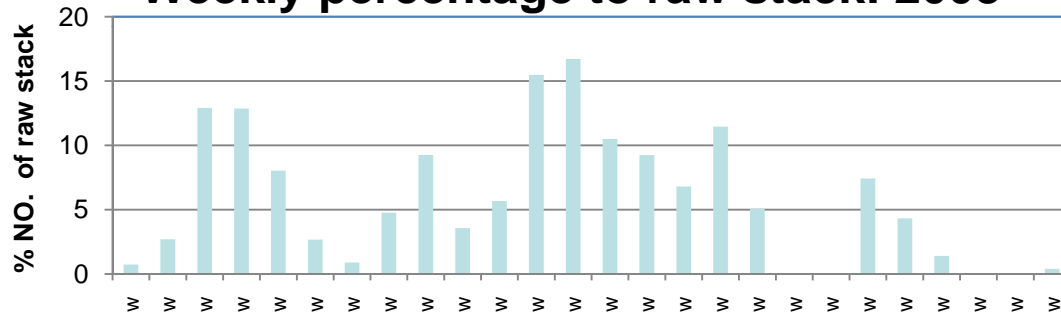
Daily percentage % to raw stack: 2007



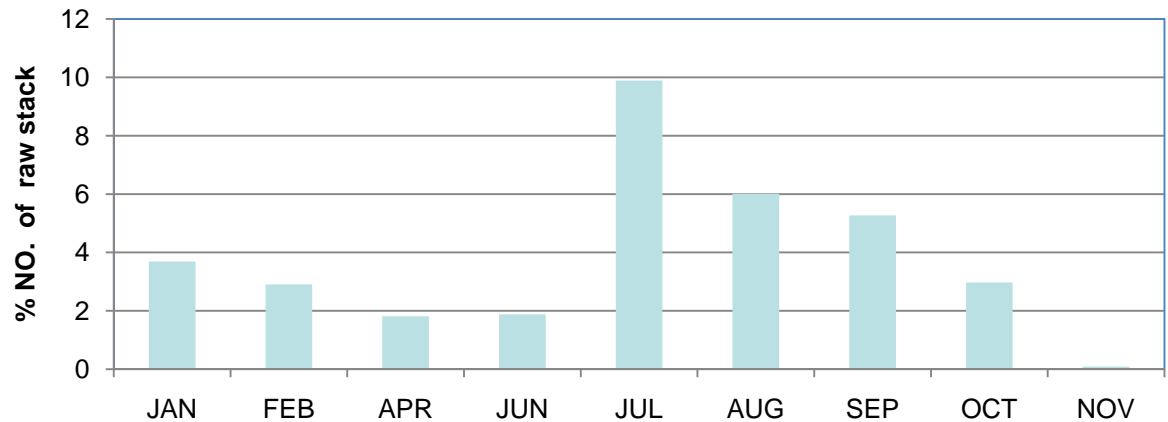
Daily percentage % they went on raw stack



Weekly percentage to raw stack: 2008



Monthly percentage % to raw stack in 2008



Pollutants from alloy production

- Pollutants from manganese ore and coke

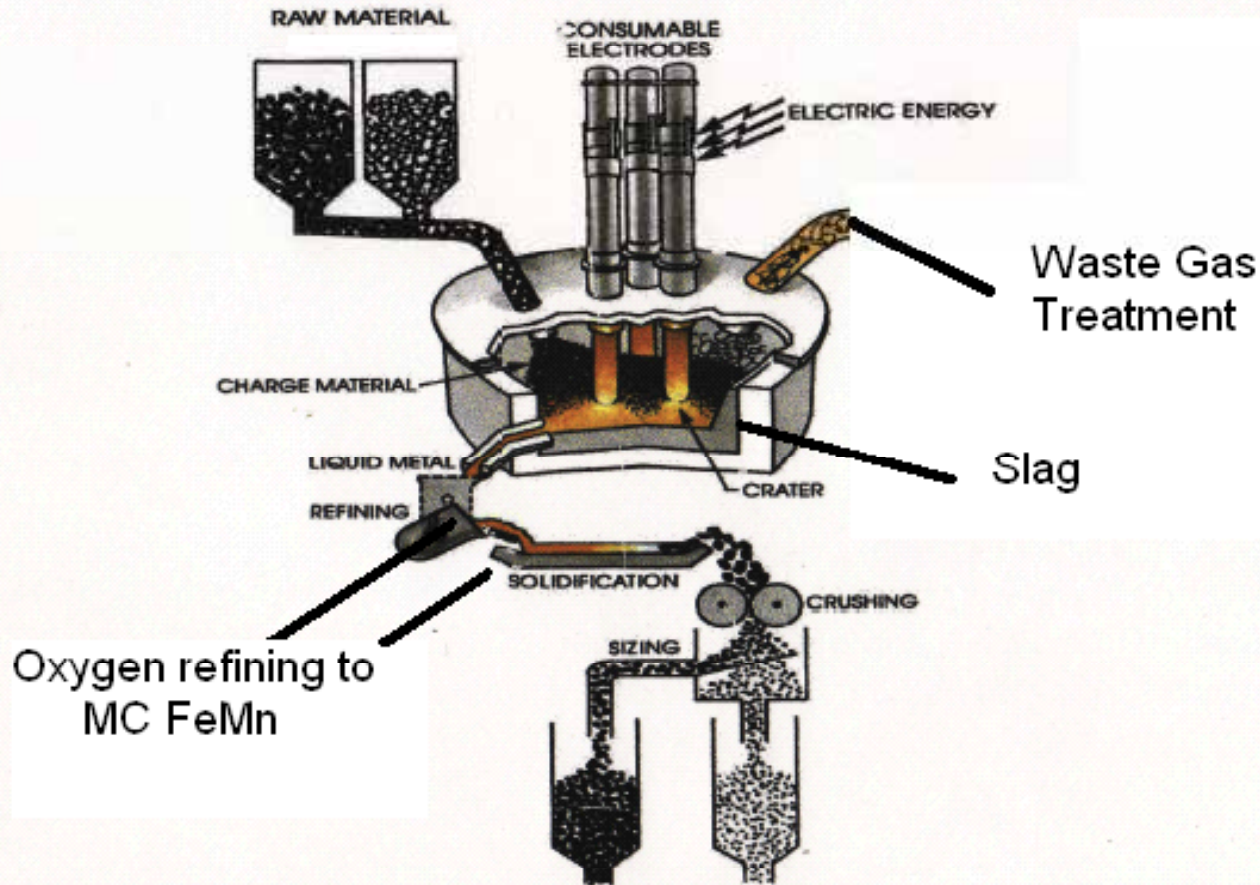
- Mn, Fe and small amounts of other heavy metals (Pb, Cd, Ni, Cr, Cu, Zn) and As
- Some ores from other countries are also contaminated by Hg
- P, SO₂ and PAH

- Pollutants generated in the process

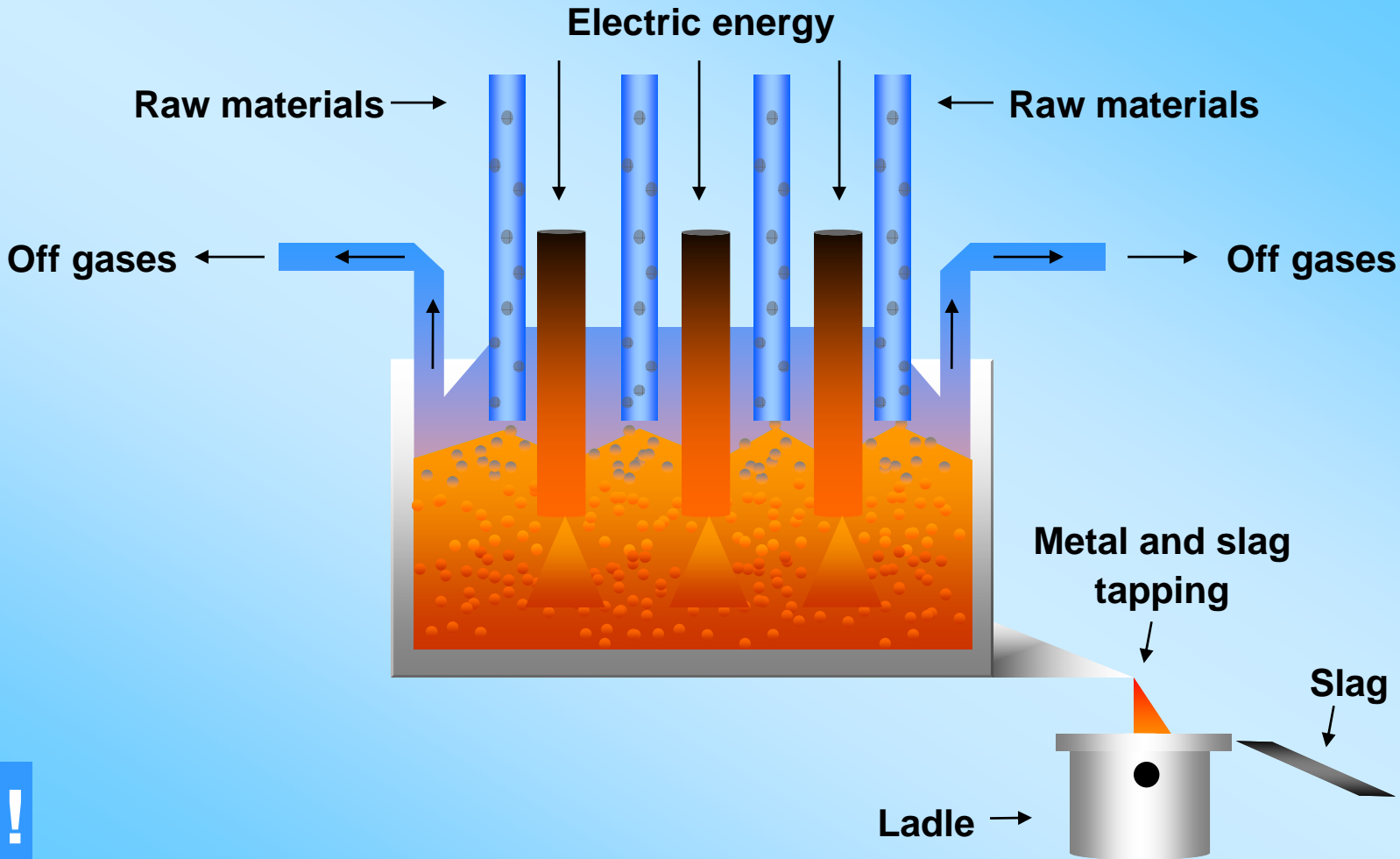
- CO and CO₂
- No_x
- Dioxins

The HC FeMn and SiMn Processes

Production of Ferromanganese

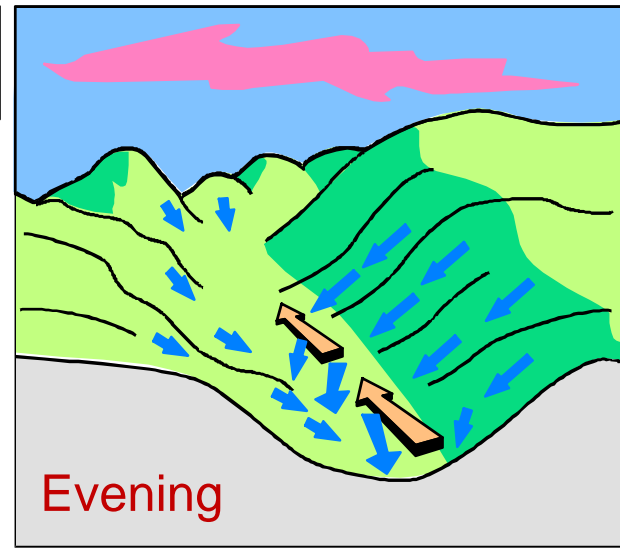
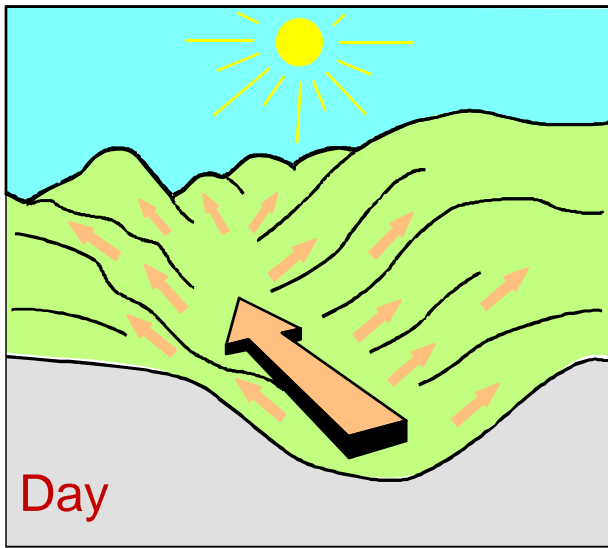
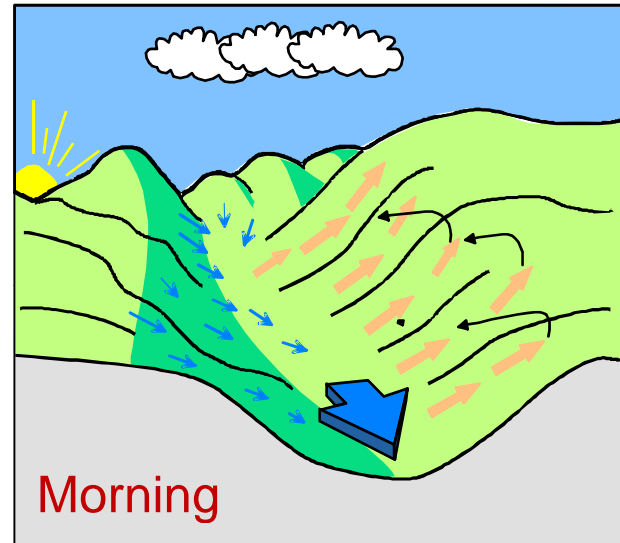
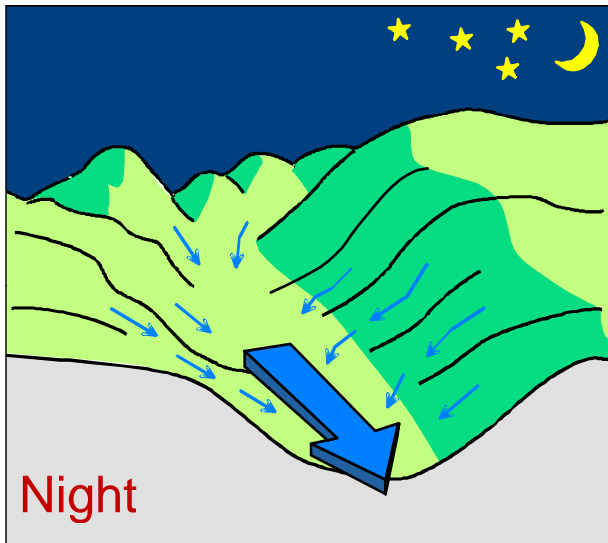


The HCFeMn and SiMn furnace



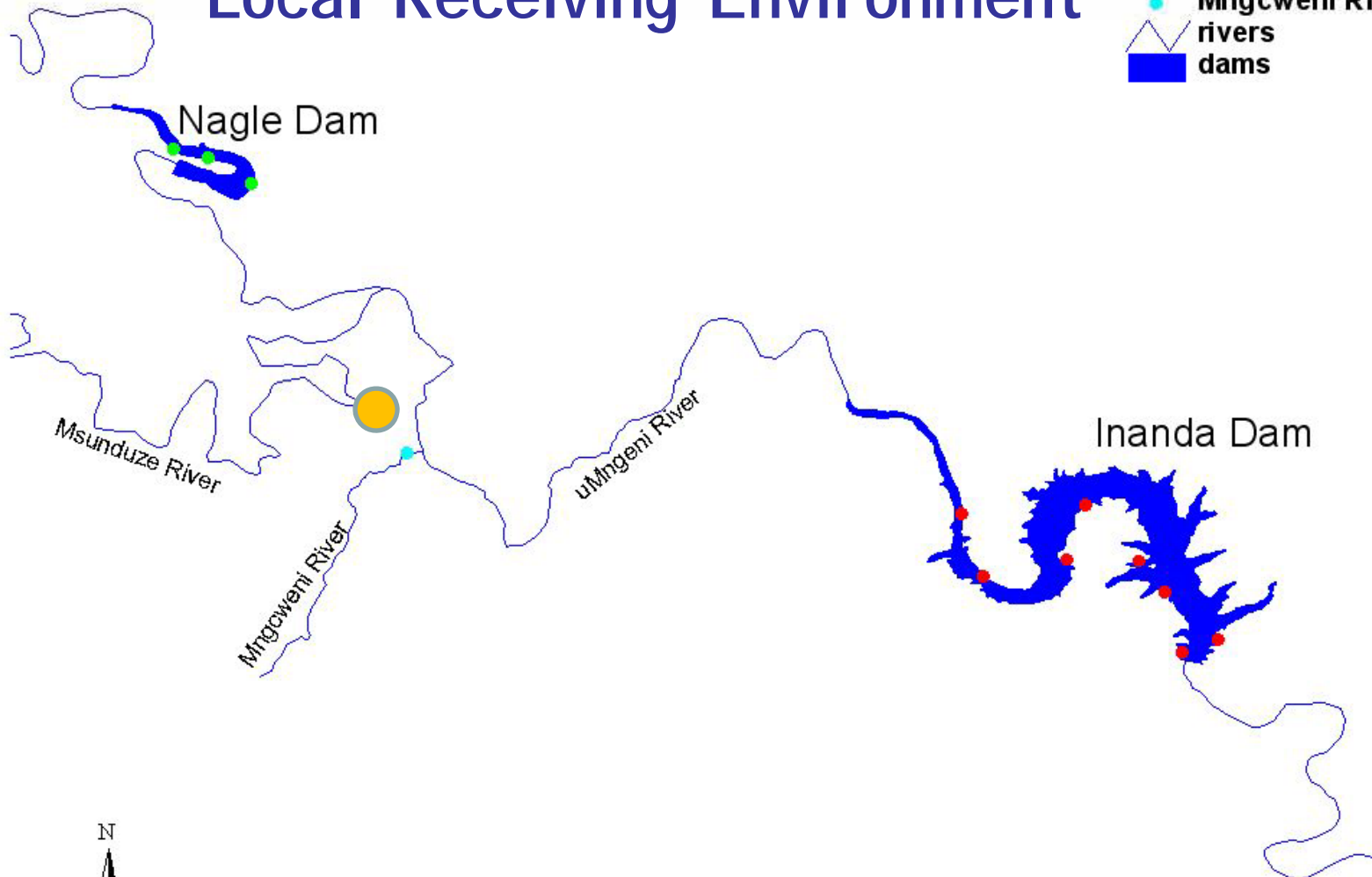
Local Meteorology

Night - day wind variations



Local Receiving Environment

- Inanda Dam sites
- Nagle Dam sites
- Mngcweni River sites
- ▬ rivers
- dams



Occupational health & safety

Significant occupational safety

Risks & hazards include :

- Mobile machinery
- Vehicles
- Falling objects
- Molten metal

Occupational health & safety

Identified stressors / hazards include:

- Noise – cranes, trucks, tractors, machinery
- Heat stress – hot molten metal
- Ergonomics

NB: List of all stressors incl. biological, chemical is required.

- Details of all controls in place.

Key Issues Emerging from Permitting Process

- Air emissions will have dust particles and heavy metals
 - Limit on concentration and load
 - Control by filter system
 - Limit on raw stack emissions
 - Facility shall reduce emissions to as low as possible
 - Diffuse emissions-subject to strict control
- Biomonitoring programme

Key Issues

- Ongoing focus on toxicity potential, bio-accumulation, bio-degradability
 - Slag shall be subject to leachability testing
- Medium term focus on energy recovery from flaring system

Control options

- **Ambient air quality monitoring**

- Ensure compliance with national regulations or guidelines and WHO recommendations

- **Dust fallout monitoring**

- Monitoring of improvement of plant performance

- **Water quality survey**

- Useful for plants with discharge to a water recipient

- **Groundwater and soil**

- Ensure that run-off from waste dumps and storages is not in conflict with national standards for water and soil

Lessons Learnt and Institutional Implications- Role of Company

- All companies should have an environmental management system dealing with:
 - Environmental goals and plans for continuous improvement
 - Clear responsibilities within the organisation
 - Documentation and procedures
 - Survey of laws and regulations
 - Systematic work with non-conformities
 - Focus on risk assessment and preventive measures
 - Responsibility to know, solve and manage the environmental problems

Lessons Learnt and Institutional Implications – Role of Authority

- The authorities should:
 - Set environmental standards
 - Regulate pollution from industries
 - Monitor compliance with regulations
 - Ensure that corrective actions are taken
 - Make sanctions when necessary
- The authorities should not:
 - Give advice on how the industries should solve their problems

Key Outputs of UEMP ETHEKWINI STTA PROCESS

- Guidance Manual developed
- National workshop held, Pretoria, Sep08
- Integrated Permit developed
- Integrated mass balance determined
- Improved institutional capacity at local level
- Now shift into broader context of the Cato Ridge development corridor and local environment

Project Replicability

- The approach used was that EHPs were required to write the permit, engage with the various stakeholders, finalise the permit and then to monitor, review and enforce it... The role of the expert and support staff was merely guide the process, the role of the project manager was to manage the process and time frames.

Major Lesson

- The STTA approach and the social-politico compact into the Assmang permit development represents a good model for approaching similar permits in S.
- The effort in systematically developing the material flow and emissions inventory enables quantification of impacts and interventions required.

Thank you