



ENVIRONMENTAL MONITORING AND RESPONSIBLE MINING

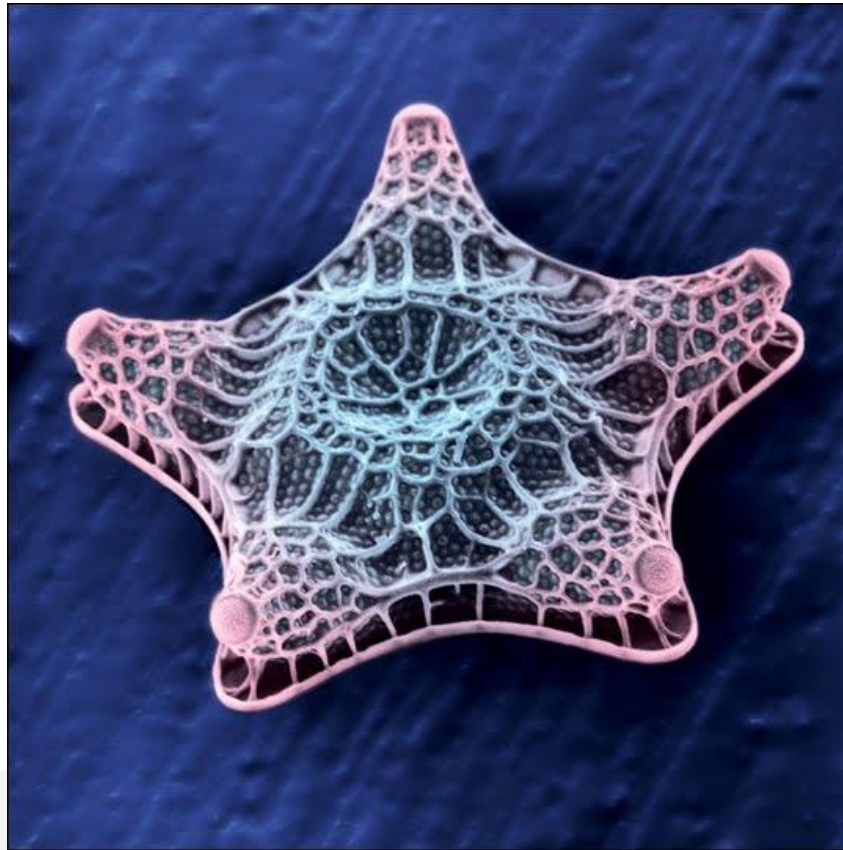
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ENVIRONMENTAL MONITORING - A WIDE SCALE



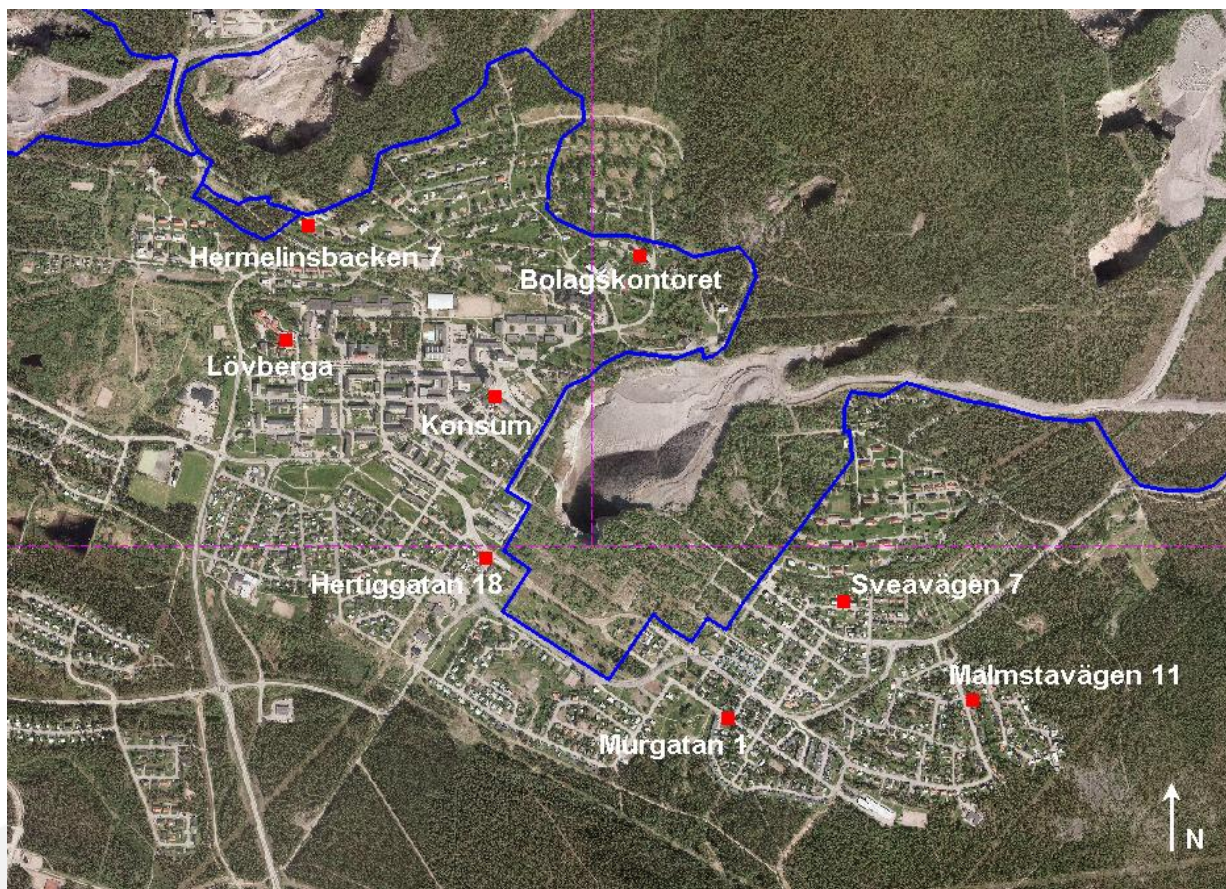
FROM MICRO.....



.....MEDIUM.....



.....MACRO.....



AND SOCIO SCALE



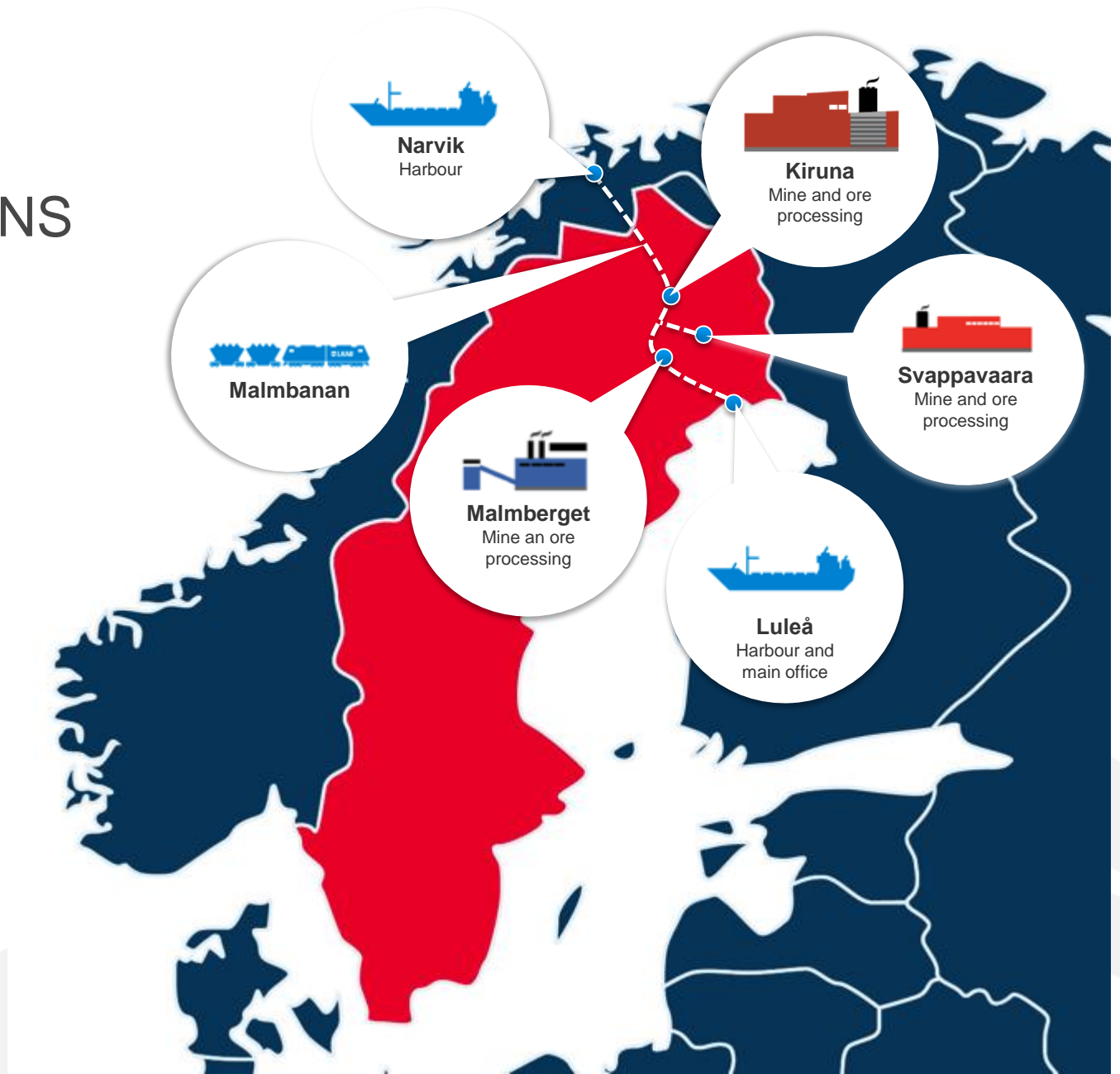
LKAB worldwide

LKAB IN BRIEF:

- #2 in the world as iron ore pellet producer and #1 in Europe
- 2010 all-time high with 26 Mton of products, net sales for € 3.1 billion
- One of the largest Swedish industrial investors (€ 2.5 billion over the last 5 years) to grow production, increase performance in iron-making and further limit environmental foot-print
- About 4,000 employees in 15 countries



IRON ORE OPERATIONS



ENVIRONMENTAL ASPECTS

- Air Emmissions
 - SO_x, HF(g), HCl (g) NO_x
- Discharge to Water;
 - Undetonated explosives
 - Process chemicals
 - Metals
- Ground water depression

MORE ENVIRONMENTAL ASPECTS

- Impact on the surface
 - Vibrations from blasting
 - Deformation of the ground surface
 - Chock wave from blasting (air)
 - Emissions to air
 - Noise
 - Irreversible change of landscape
- Social impact
- Other issues
 - Use of finite resources
 - Use of fossil fuels – greenhouse gases
 - Impact from downstream processing and use of the product
 - Blast furnace and melters

ENVIRONMENTAL ASPECTS OF MINING (LKAB)

	Local	Regional	Global
Mining	Deformation on ground surface Vibration and chock waves	None	None
Mineral processing and tailings disposal	Discharge to water, nitrate ammonia, dissolved main and trace element	Small	None
Metallurgical processes	Gas and particle emission to air	Small	Climate (CO2 emissions)

ENVIRONMENTAL MONITORING GOALS AND OBJECTIVES

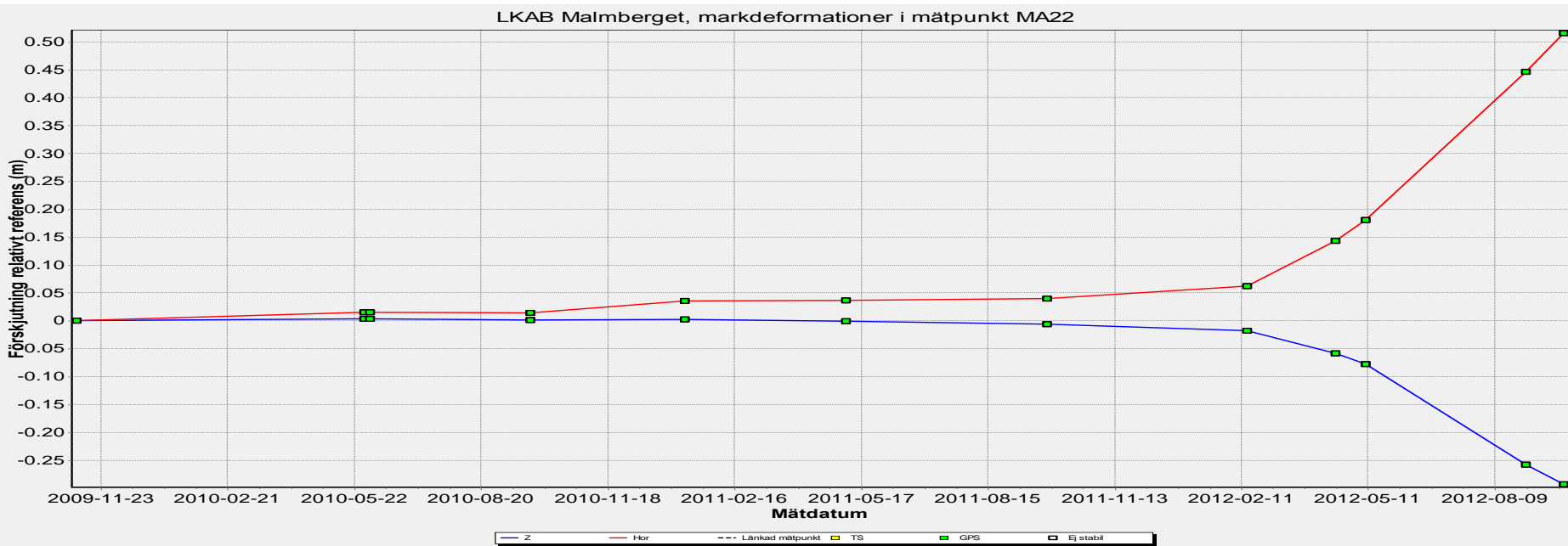
- Goal
 - Demonstrate to community that the operations complies with limit values and environmental impact assessments
- Specific objectives
 - Define base line and impact
 - Detect short and long term trends
 - Recognise environmental changes and analyse causes
 - Measure impact and compare with predicted impacts
 - Improve practices and procedures for environmental protection



SPECIFIC OBJECTIVES: DEFINE BASELINE AND IMPACT



SPECIFIC OBJECTIVES: DETECT SHORT AND LONG TERM TRENDS

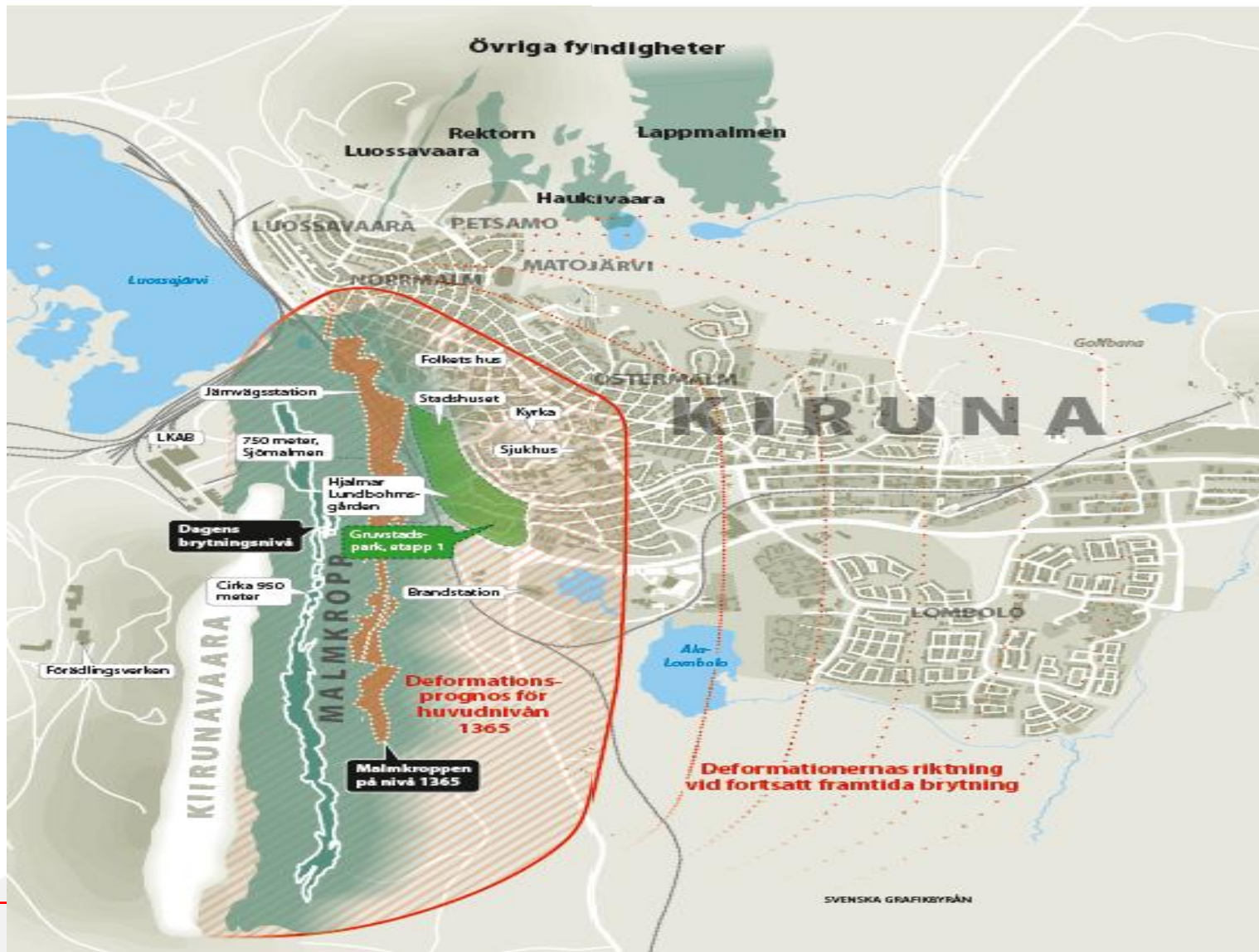


Deformations on the surface

- Long before the fractures are visible on the surface, deformations occur in the ground.
- A few centimeters of change in the ground is enough to damage electricity lines and water and sewage pipes.



Predictions



A RESPONSIBLE MINING COMPANY SHOULD;

- gather well documented facts about base line values in considered future possible mining area
- have the best overall knowledge about emissions and impact
- employ experts in every environmental key issue
- cooperation with the best experts and researchers that are available in specific crucial areas
- well defined and long term measurements
- communicate with evaluated data, never raw data