



**RAME Research Association Mining and Environment in Vietnam**

**Project location**



**Client**

VINACOMIN, VITE  
Environmental construction

**Term of project**

Sep 2007 to Dec 2012

**Funding**



[Gesamtefödersumme ]

**Project executing organisation**



**Costs for Construction and Equipment**

1.700.000 Euro

**Costs for planning services**

180.000 Euro

**Initial situation**

Untreated mine drainage water from an anthracite coal mine owned by the Vietnamese mining company VINACOMIN was released into the Vang Danh River. The polluted water then discharges into the Ha Long Bay which is classified by the UNESCO as World Heritage Site. The mine water contains high concentrations of iron, manganese and suspended coal particles. In Vietnam an conflict situation is arising between expanding mining activities, the increasing environmental awareness, tourism and farming. Moreover a limiting value catalogue for industrial wastewaters was adopted by the Vietnamese government in the year 2005.

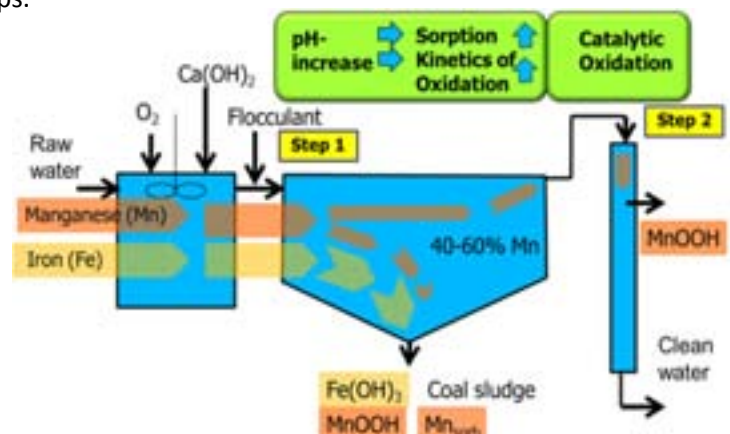
**Research project**

Three German project partners developed, planned and built a mine water treatment plant in Vang Danh together with the Vietnamese project partner VINACOMIN. The necessary fundamental research and process development was funded by the German Ministry of Education and Research. The first of three modules of the treatment plant was designed for a capacity of 800 m<sup>3</sup>/h. Prerequisites for the treatment process were a low demand of chemicals and the implementation of the plant on a limited construction area. The RAME project is going on until 2015, but the sub project "Mine water treatment" will be completed successfully in December 2012.

**Treatment technology**

The treatment technology was designed for the removal of iron, manganese and suspended solids. The challenging process of manganese removal consists of two subsequent treatment steps.

The final demanganization step was realized by a catalytic sand filter system with special filter material. The mine water treatment plant in Vang Danh is regarded as showcase for further plants in Vietnam.





## Project coordination

Prof. Dr. Harro Stolpe,  
Ruhr-Universität Bochum,  
Environmental Engineering  
and Ecology  
44801 Bochum  
+49 234 32 29 95  
harro.stolpe@rub.de

## Contact in Vietnam

CEO, Dr. Katrin Brömme,  
Le Duan 226,  
Hanoi,  
+84 90 56 94 571  
Katrin.broemme@gmx.de

## German project partners

LMBV - Lausitzer und  
Mitteldeutsche Bergbau-  
Verwaltungsgesellschaft mbH,  
Knappenstraße 1,  
01968 Senftenberg,  
contact: Jörg Schlenstedt  
+49 3573 84 4424  
j.schlenstedt@lmbv.de

eta AG engineering,  
Dissenchener Str. 50,  
03042 Cottbus,

contact: Hans-Jürgen Kochan  
+49 355 28924211  
hjkochan@eta-ag.com

GFI Grundwasserforschungs-  
institut GmbH Dresden,  
Meraner Str. 10,  
01217 Dresden,

contact: Dr. Felix Bilek  
+49 351 4050674  
fbilek@gfi-dresden.de

## Operating parameters

Average INFLOW water quality and design values for the mine water treatment plant	Target parameters according to Vietnamese regulations for industrial waste waters (TCVN 5945-B)
pH: 5.8	pH: 5.5 - 9
Fe <sub>tot</sub> : 50 mg/l	Fe <sub>tot</sub> : < 5 mg/l
Mn: 10 mg/l	Mn: < 1 mg/l
TS: 500 - 1500 mg/l	TSS: < 100 mg/l
COD: 140 mg/l	COD: < 80 mg/l
BOD <sub>5</sub> : 70 mg/l	BOD <sub>5</sub> : < 50 mg/l

## Construction

The mine water treatment plant was designed for a capacity of 800 m<sup>3</sup>/h and shall be enlarged to 2400 m<sup>3</sup>/h. The construction was done by the Vietnamese project partners (VITE and the Environmental Company of VINACOMIN). The technical equipment was provided under supervision of the Vietnamese companies SETFIL and PECOMVN.



## Development of an innovative treatment process for mine waters

- suitable for high Mn-concentrations (combination of two treatment steps)
- catalytic surfaces are used for Mn-removal
- low demand of additional chemicals
- modern technology
- low demand of area
- easy to control and to regulate
- designed for long-term operation
- the treatment capacity can be enlarged easily