

# Operations Management System For Water Management Plants

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## ABSTRACT

Emschergenossenschaft and Lippeverband are a water association with more than 300 water management plants which has built an integrated management system in order to run the company according to the technological rules. The core element of the company management system is the Specific Business Instruction "Operation". It contains definitions on the structural and operational organisation.

Procedure instructions within the company management system are binding instructions for the execution of defined procedure, processes and operations.

The model labour instructions realise the definitions described in the operation instructions for a model plant. For 5 plant types (wastewater treatment plant, storm water tank, pumping station, sewer, water-course), the created model labour instructions reflect the framework of requirements. Taken together, the model labour instructions and their appendices provide a pattern for creating the plant-specific operations manual.

The model labour instructions are adapted to every single company plant to the plant-specific conditions. Together with the inventory documents, they make up the operations manual.

Every operations manual for single plants consists of approx. 40 labour instructions. For more than 300 plants, approx. 12.000 single instructions have been created.

The project organisation and the costs are described as well.

## KEY WORDS

Management System  
Specific Business Instruction "Operation"  
Procedure instructions  
Model labour instructions  
Operations manual

## **INTRODUCTION**

Emschergenossenschaft and Lippeverband operate 65 wastewater treatment plants and 184 pumping stations, plus a large number of other water management devices in the catchment areas of the River Emscher and the lower part of the River Lippe. Of the total number of 1470 employees, about one half work as operation and maintenance personnel at the plants.

## **CAUSE AND MOTIVATION**

The operation of water treatment plants and sewage systems must be regulated by operations manuals in order to fulfill the legal requirements for the state of the art operation and the co-operative regulations for labour safety and health. At the same time, the staff employed at the respective plants need instructions for extraordinary, non-routine situations. An unequivocal allocation of responsibilities and the documentation of the organisational processes are necessary to avoid any organisation faults of the plant management.

## **PREVIOUS DOCUMENTS**

For as long as Emschergenossenschaft and Lippeverband have been operating their wastewater treatment plants, there exist operations manuals for these plants, which in the course of time have been adapted to the ever more complex questions and tasks. For some time now, these instructions have already been based on the model of the Lippeverband. For individual topics that are relevant for the operation (such as flood protection, message paths, placing of orders, and many more), there existed a large number of instructions which had to be integrated into a management system.

## **DEVELOPMENT OF THE CURRENT INSTRUCTION SYSTEM**

In order to run the company according to the technological rules, since 1996 an integrated management system has been implemented, the major component of which is a main business instruction. During the development of a version of the operations manual for all plants types as crucial component of an integrated management system that should be as unified as possible, it became apparent very soon that a compact text in the shape of a conventional operations manual was neither feasible nor maintainable, but that a system of single instructions had to be created. The system was created according to the definitions of the Abwassertechnischen Vereinigung (German Association for Water Wastewater and Waste) in Germany, which are laid down in the ATV-DVWK Advisory Leaflet M 801 „Integrated quality and environment management system for wastewater treatment plant operators”. With the ATV-M 801 [ATV/1997], the requirements of the ISO 9000 ff. and ISO 14 000 ff. were interconnected and transferred to wastewater treatment companies. The integrated quality and environment management system for the operators of wastewater treatment plants that is derived from the ATV-M 801 is not structured into single elements, but the structure is created according to the actual activities and processes. Though ATV-M 801 had been developed before 2000 it fits into the more process based actual version of ISO 9001. The work in the main department “Operation” of Emschergenossenschaft and Lippeverband for the development of a system of specific management instructions, operation and labour directives was run on this basis. In the following, this system will be presented in detail.

## STRUCTURE OF THE OPERATION MANAGEMENT SYSTEM

For the operation management system, a multi-stage structure was chosen, based on the concept that the delegation principle should be integrated into the system as consistently as possible. The definitions of the supreme hierarchy level thus spread into the single actions on the respective operation plant. Moreover, the selected structure guarantees the maximum dovetailing of the norm requirements on quality and environment management with the operative company level. The structure of the operation management system is presented in Figure 1.

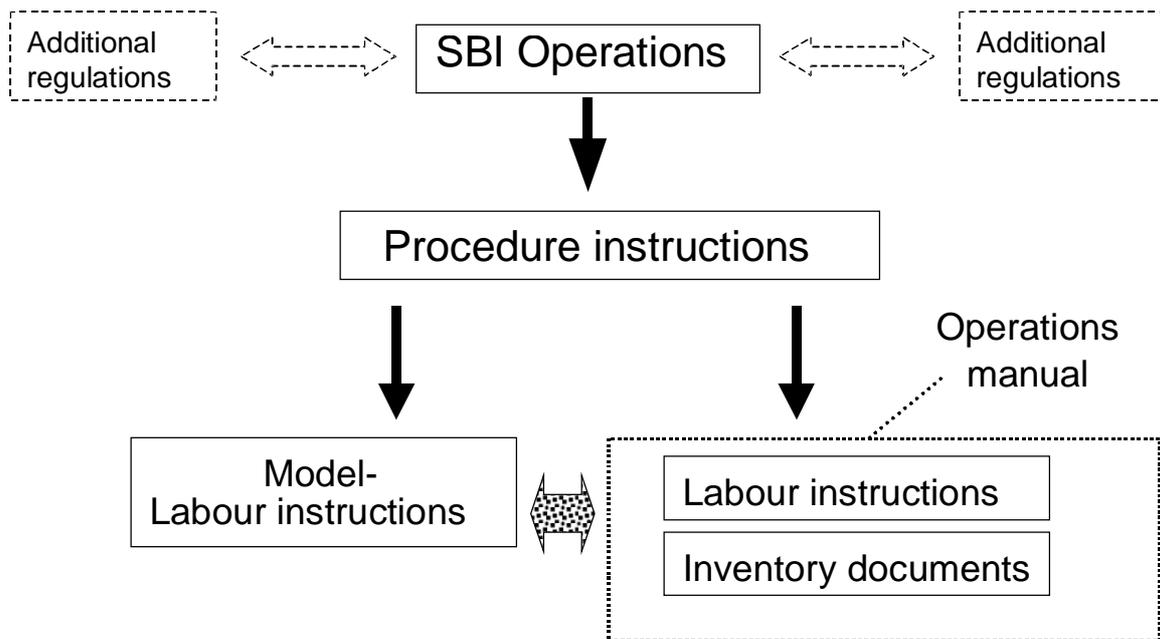


Figure 1: Structure of the company management system of Emschergenossenschaft/ Lippeverband (SBI = specific business instruction)

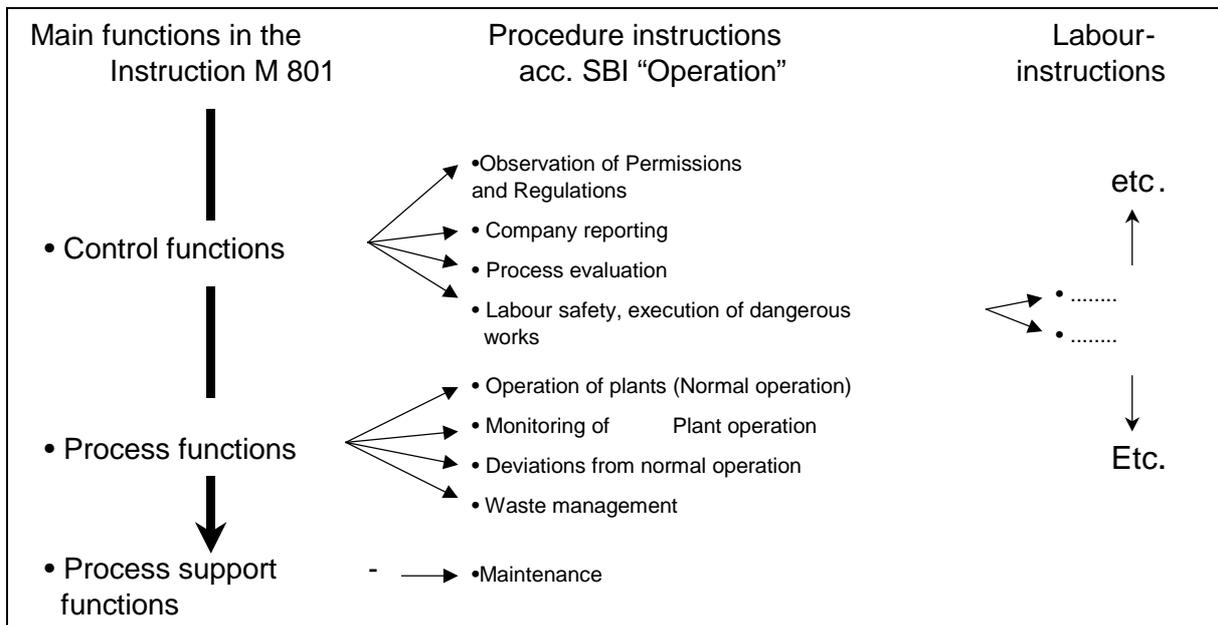
## SBI OPERATION

The core element of the operation management system is the Specific Business Instruction "Operation", which is to be passed by the board of directors. This SBI mainly defines the responsibilities for the introduction, evaluation and continuation stages of the management system. In the area of the process organisation, those processes (elements) are defined the details of which must be more minutely defined in the procedure instructions of the subordinate instruction level.

## PROCEDURE INSTRUCTIONS

Within the operation management system, procedure instructions are binding instructions on the execution of defined procedures, processes, and events. They contain definitions on what has to be done when, where, how, by whom, using which materials and considering which documents, and how this shall be controlled and documented (according to [n.n./2000]). Furthermore, the respective procedure instruction contains explicit regulations on which labour instructions of the service and operation instructions for the operation plants shall be worked out by whom on the operative company level.

By the Specific Business Instruction “Operation”, those procedures of the Operation Management System are defined which must by all means be regulated. Their allocation to the main functions defined in the ATV-M 801 is presented in Figure 2.



**Figure 2: Functions within the Operation Management System**

Further indispensable procedure instructions describe the definitions within the system and the principles of the operational labour organisation.

## MODEL INSTRUCTIONS

The model labour instructions realise the definitions for a model plant described in the procedure instructions in an exemplary way. For 5 types of plants (wastewater treatment plant, storm water tank, pump works, sewage system, waterway), model labour instructions are created which reflect the range of requirements. Taken together, the model labour instructions and their appendices form a model for the creation of the plant-specific operations manual.

## LABOUR INSTRUCTIONS

The model labour instructions are adapted for the individual plant of Emschergenossenschaft and Lippeverband to the plant-specific conditions. Together with the inventory documents, they form the operations manual. According to [n.n./2000], the labour instructions shall describe and prescribe in detail and in a binding manner for the operator when, where, and how a given activity/work should be executed. Any labour instruction is issued by the executives of the middle and lower executive level for their respective area of responsibility, thus putting in concrete terms the more abstract definitions of the procedure instructions. In order to guarantee a consistent delegation of responsibilities and thus a sufficient transparency, any labour instruction can always be derived from only one procedure instruction, whereas in one procedure instruction several labour instructions are required (cf. also Figure 2). Labour instructions are supplemented by appendices (forms, explanations, specifications, etc.), so that they are applicable and usable for the staff on location.

## **INVENTORY DOCUMENTS**

The inventory documents comprise official permissions and licences, contracts, execution and inventory plans, and real estate plants. Within the DuBA, it is recorded where these inventory documents are kept, so that the operation can run with as little friction as possible.

## **SUPPORTING REGULATIONS**

The operation management system is supported by a company-internal body of regulations comprised of standards and planning directions. This body defines the execution qualities in a binding manner.

## **CREATION OF THE OPERATION MANAGEMENT SYSTEM**

For creating the operations manuals as component of the integrated management system, the already available documents were reviewed and company-internal knowledge was exploited. 5 project groups were formed, corresponding to the 5 plant types described above, which – co-ordinated by an external project controller – was bound to create the operations manuals for the 5 operation plants of Emscher genossenschaft and Lippeverband in an exemplary way, or adapt them to the current requirements.

After the publication of the ATV-M 801 [ATV/1997], these project groups were dissolved and a company-internal project group „Operation Management System“ was implemented, which was comprised of the project co-ordinator and the project guidance group. For the project guidance, two staff members were appointed, who in the first project stage co-ordinated the creation and introduction of the Specific Business Instruction “Operation”, the procedure instructions, and the model labour instructions, who checked the single documents for their conformity to the project structure, and who guaranteed the information to the project co-ordinator and the delivery of the finished documents to the system commissioner. The head of the department “Operation” defined the responsible organisation units for the creation of the Procedure Instructions and the Model Labour Instructions, the commissioners of which pass the documents on introduction on to him, determine or accept the necessity for changes, and do the revisions, if necessary. The commissioners for the Model Labour Instructions are mostly responsible for the creation of single instructions for one plant type. Yet, as the instruction structure should be as unified as possible for all plant types throughout the company, it is necessary that the commissioners go for a topic and plant type specific co-operation. During the initial creation of the instruction, this co-operation is co-ordinated by the project guidance group; after the introduction of the system, this task goes over to the system commissioner.

In the second project stage, the model labour instructions are adapted to the conditions of the single operation plants by the operation engineers responsible for the respective plant in agreement with the plant managers. The project guidance will in the meantime have been transferred to the team “Co-ordination Operation”, which is responsible to care for those working on the specific DuBA in an expert and co-ordinating manner and to keep the project co-ordinator informed about the respective state of development.

## **INTRANET USAGE AND USE OF INTERNAL COMPUTER NETWORKS**

One crucial target is to make the entire operation management system available to the employers via the intranet. The currently valid versions of the documents (labour instructions, operation forms, message chains) are to be entered into the intranet as soon as possible. Different access and computing permissions will be distributed within the computer network of Emschergenossenschaft and Lippeverband, adapted according to the project structure. This guarantees the topicality of the documents and the clarity of revisions, and generally the overall transparency throughout the company.

As a failure of the intranet in critical situations (floods, thunderstorms, etc.) cannot be excluded, the master copy for each plant must be kept in printed form. This copy is updated by the system commissioner, whose actions must be granted with a receipt by the respective recipient.

## **COMMISSIONER OF THE SUPREME MANAGEMENT LEVEL**

According to the norms on quality and environment management, the member of the board "Technology" is invested with the function of commissioner of the supreme management level. In this function, he ensures the operations management system being developed and maintained within the main department "operation". By allocating the responsibilities in their area, they directly contribute to the realisation of the management system. Furthermore, they report to the board of directors about the development and performance of the management system.

## **HEAD OF DEPARTMENT "OPERATION"**

The responsibility for the operative business of the operation of technical plants at Emschergenossenschaft and Lippeverband lies in the hands of the head of main department "Operation", who is generally in charge of the realisation of the company model and, if necessary, for the dissemination of the respective principles, objectives, and programs. Moreover, they are also responsible within the operation management system for the tasks listed below:

- Determination and commanding of the necessary and qualified personnel and the necessary means in agreement with the board of directors
- Creation and maintenance of the necessary procedure instructions
- Creation, introduction, and maintenance of the necessary model labour instructions
- Definition of correction and precaution measures in agreement with the commissioner of the supreme management level, and control of the efficiency of these measures
- Participation in the co-ordination of training and coaching programs
- Monitoring of the application and efficiency of the operation management systems.

## **SYSTEM COMMISSIONER**

The commissioner of the supreme management level appoints a system commissioner for support during the introduction, guidance, and monitoring of the management system. The system commissioner is particularly responsible for keeping the binding version of the procedure and model labour instructions, as well as for maintaining and distributing these instructions. Further tasks in this area are the collection and presentation of suggestions for improvement of the operation management system.

The person charged as system commissioner also is responsible for maintaining the internal standards and planning directions.

## CONCLUSION

The necessity to introduce an operation management system had first to be aroused in executives and staff, and then promoted as long as it takes to make the advantages visible for all users. This process happened in three stages:

- The demands of the self-monitoring requirements and the public discussion about the organisation responsibility made the upper management level trigger off the realisation of an operation management system.
- The middle management had to be convinced prior to the creation of the procedure and model labour instructions that a management system would considerably alleviate their tasks, as it presents the responsibilities in a transparent manner.
- The lower management (e.g. the plant managers) has to work very hard for the creation of the labour instructions for the technical plants and then make sure that the labour instructions are realised by the personnel.

What applies unanimously to all levels is that in spite of a heavily detailed structure, which took some getting used to, the advantages for everybody concerned became more than apparent and that everybody involved took part constructively in the introduction of the instruction system

Procedure instructions which are derived from other specific business instructions for instance on company-exceeding topics such as labour safety or environment protection must be considered in the creation of the labour instructions of the operation management system. The creation of a network with other specific business instructions of Emschergenossenschaft and Lippeverband is guaranteed through cross references or through anchoring monitoring duties of other departments in the relevant procedure instructions.

The labour instructions created so far deal mainly with the local plant operation. Furthermore, there is also the necessity to regulate and document further activities in a unified manner (process supporting functions, such as procurement, etc.).

Employees of the upper, middle, and lower executive levels have been taking part in the creation of the operation management system, but also consultants which were particularly commissioned for this project. The sum for the purchasing of these performances amounted to ~ 250.000,- EURO; the company-internal efforts at Emschergenossenschaft and Lippeverband reached a similar dimension. The resulting sum is a considerable one; however, it must be apportioned to the large number of operation plants. When we consider only wastewater treatment plants and pumping stations, the costs per plant (which do not include those for the maintenance of the inventory documents, which have been acknowledged as necessary) of approx. 2250,- EURO must be regarded as cost-effective.

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