SOURCE-ORIENTED CONTROL OF POLLUTION

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Summary

The permitting system is central to the design and implementation of a regulatory framework intended to protect the natural environment against source-oriented anthropogenic pollution. The need to legislate for permitting systems, based on internationally accepted principles such as the Precautionary Principle, the Principle of Pollution Prevention, and Public Participation and Disclosure, is now being widely accepted as an essential pre-requisite for the achievement of sustainable development.

Furthermore, recognising that environmental pollution should be considered in a holistic fashion and not compartmentalised separately as air pollution, water pollution etc., many countries are now moving towards integrated multi-media permitting and inspection systems based on emission limit values and best available technology.

These issues are discussed in this contribution along with the germane issues of emission and effluent limits, performance standards, facility design requirements, trade in pollution discharge rights, and best management practices.

1. Licensing and permitting of discharges

The permitting system is the core of the implementation of a regulatory framework, concerning the protection of the environment against pollution caused by emissions, discharges or disposal of wastes of a certain activity. In recent years, the legislation referring to environmental permits has not implemented only general, preventing conditions, but a more integrated approach, according to which the environmental

impacts are viewed as a whole and consequently the relevant permits refer to all environmental impacts involved.

In recent years permitting strategies and legislation have been based on internationally accepted principles that are of great importance to Sustainable Development. These principles are:

- The precautionary principle
- The principle of pollution prevention
- The ecosystem approach
- The concept of ecologically-limited carrying capacity
- Full cost accounting and best practical environmental options
- Integrated multi-media permitting approaches
- Public participation and disclosure

Furthermore, two basic complementary approaches are taken into consideration while planning a permitting system:

Pollution prevention at source. The best results are obtained when emissions are prevented at source, not at the end-of-pipe, and the BAT are to contribute to this approach.

Specific environmental characteristics of each recipient must be protected.

Guidelines for setting BAT-based ELVs and general EQOs as well as a general framework should be available at the national level, including the methodologies used for defining the requirements (e.g. determination of risk, risk limits, stack height, diffusion models, mixing zones).

Where EQSs are exceeded in spite of BAT requirements, further reduction of polluting releases must be achieved over and beyond BAT, so that a particular source or a group of sources operating in that particular area will not contribute to a breach of the environmental quality. If necessary, these requirements may lead to forced shut-down of some existing sources or denied authorisation for new sources, process expansion or modification.

As a general principle, economic considerations should not lead to the relaxation of environmental requirements, but they are often used to weigh several factors against each other (e.g. technical feasibility, social and political acceptability).

Permitting needs to be designed as a continuous, open-ended policy process, which can adapt to new developments and ensure that environmental performance is constantly improving as economic growth progresses. Permitting strategies should be devised and implemented so as to benefit fully from the interaction with the ongoing development of new policy instruments (i.e. LCA, EMAS, discharge fees, green taxes, etc.).

In some countries, government authorities have had de-emphasised traditional permit requirements, focusing instead on environmental quality and technology-based standard-setting and assessment of environmental performance.

Thus, many countries are moving towards integrated permitting and inspection systems, and others are now considering these approaches. This movement reflects several concerns, including: (1) recognition that the environment and impacts on the environment often are not easily compartmentalized into single media such as air, water and land, but it is the integrated system, requiring integrated considerations on the best approaches to control pollution and its impacts, (2) increased emphasis on prevention of pollution which often requires an integrated consideration of new processes and technologies rather than end-of-pipe treatment for a single environmental medium, (3) a desire to achieve greater efficiency in permitting and inspection activity, and (4) a desire to avoid pollution transfer from one medium to another.

An example of environmental regulation is the Directive 96/6 I/E/C adapted by the Council of the European Union, that covers pollution of air, water and land emanating from large installations (defined by thresholds) of 33 industrial sectors. Article 3 lists the general principles governing the basic obligations of operators.

Involvement of the public is an increasingly important factor of permitting. Public access to the permitting process must be comprehensive and systematic, so as to ensure transparency and legitimacy.

This is particularly critical for the surveillance of site-specific requirements. The use of informational instruments such as Pollutant Release and Transfer Registers and other disclosure mechanisms is a valuable tool in this regard. These registers not only aim at informing the public about the type and amount of the pollutant releases of a certain activity, but they are also used by the authorities in decision and policy making.

The permitting procedure includes a circle of phases beginning with the application procedure. Usually, the basic elements of an application submitted to the competent authority are: General information about the facility, activity and the enterprise (class/enterprise number, number of employees, operating hours).

General and/or special information about the situation of the enterprise. Elements of the production process: products manufactured and their amounts per year or per 24 hours in case of seasonal operations, description of the production plant, the input materials and their amount used every year (or every 24 hours), energy sources and consumption, possible energy saving measures, evaluation of the environmental impact of production.

The application form is usually of a different type in each country. The duty to apply for a discharge permit follows the respective legislation. The application can be obtained from the Pollution Control Authorities, either National, or Regional or Local. The operator of the activity or facility that discharges, must complete all sections of the application and submition in some copies, following guidelines provided by the Authorities.

An important part of the process of the approval of environmental terms is the procedure of public participation.

During this procedure, a copy of the application is sent by the competent, central of regional, environmental authority so it is announced and set at the disposal of everyone concerned, for a period of time. An open discussion about the application and the project or activity may take then place, during which everyone concerned (public: citizens or organizations) can express an opinion.

At the end of the above procedures the regulator must either grant a permit or refuse it. When granted the permit refers in writing referring to the legislation in force and the procedure. This written permit defines the environmental conditions including :

- The protection measures that must be taken.
- The BAT in combination with the EQO, the technologies and techniques as well as the end of the pipe technologies that are to be used.
- Emission limit values.
- Monitoring programs and reporting requirements.
- Compliance timetable.
- Other conditions.

Inspections are carried out by the competent authority and in case of violation of the permit terms necessary reccomendations are given or penalties are imposed on the operator. Permit reviews are instituted to check whether permit conditions continue to reflect appropriate standards. Regulators will review permit conditions in the light of new information on environmental effects, available techniques or other relevant issues.

Licensing procedure and permits issuing are the basic elements for the implementation and enforcement of the Environmental Law. Permits issued on the basis of the integrated approach are used by legislation to accomplish the targets of Sustainable Development. Therefore, the enforcement of the appropriate legislation is vital for the adoption of an adequate permitting procedure. The efficiency of this procedure depends on the result, i.e. an environmentally sound activity and the protection of the environment as a whole.

Permitting must be designed as a continuous, open-ended policy process which can be adapted to new developments and ensure that environmental performance is constantly improving as economic growth progresses. This is the concept of the most up-to-date approach of integrated permitting systems.

Actually, few permitting systems are truly integrated. Most countries are still in a transition towards integrated multi-media permitting, although the philosophy of the 96/61/EC Directive concerning Integrated Pollution Prevention and Control (see Licensing and Permitting of Discharges) is more or less generally accepted. Shifting from a segregated (i.e. environmental media-specific) system to a fully integrated system may be still over-ambitious in the short term.

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Biographical Sketches

Mr. Alexandros Karavanas has two Masters degrees, one in Chemical Engineering from the National Technical University of Athens, Greece, awarded in 1977, and the other in Pharmacy awarded by the University of Athens in 1991. He also undertook postgraduate studies in Sanitary Engineering at the Athens Sanitary School in 1990. Since 1981 he has been working for the Ministry of the Environment, Planning and Public Works, Government of Greece, and since 1989 he has been working in the Environmental Permitting section of the Ministry.

During 1997-2004 Mr. Karavanas had been a representative of the Greek Ministry for the Environment on the EC Committee concerned with Article 19 of the EC Directive 96/61 "Integrated pollution, Prevention and Control (IPPC)" concerning the reporting of IPPC industries, and on the Technical Working Group on Food and Milk of the European IPPC Bureau in Saville, Spain. He has participated in several projects of the Ministry concerned with IPPC and has publications on IPPC and related issues such as Best Available Technologies (BAT) and control of industrial emissions.

Dr. Michael Christolis is a Civil Engineer specializing in environmental science and technology. Currently he is working as a research collaborator at the National Technical University of Athens (NTUA), Greece, on the mathematical modelling of environmental problems. He has so far accumulated twenty years of experience in air quality monitoring, pollutant dispersion modelling, assessment of the impacts of industrial accidents, design of emergency systems, and implementation of the Seveso Directive in Greece.

During 1983-1988 he was the Head of the Laboratory for the Air Quality Monitoring Network for the City of Athens. In 1988 he joined the Computational Fluid Dynamics Unit (CFDU) of the Chemical Engineering Department of the NTUA, working on research projects on the computational modelling of various applications focusing on environmental issues and problems.

Professor Nicholas C. Markatos obtained his Diploma in Chemical Engineering from the National Technical University of Athens, Greece, in 1967, followed by M.Sc, DIC and Ph.D degrees from the Imperial College of Science, Technology & Medicine, University of London, UK, during 1970 to 1974.

In 1983 Professor Markatos was appointed Director of the Centre for Mathematical Modelling and Process Analysis at the school of Mathematics and Scientific Computing of the University of Greenwich, London, England. At that time he was also a visiting lecturer to the Computational Fluid Dynamics Unit of Imperial College as well as working for CHAM Ltd, (Concentration Heat and Momentum, Limited), London, England. At CHAM he worked first as leader of the Aerospace Group (1976) and then, from 1977 until 1984, as Manager of the Applications Team working on various Fluid Mechanical, Thermodynamic and Transport problems.

Since 1974 he has served as technical consultant to many Research Centres, state institutions and industries.

In June 1980 he was awarded the "Certificate of Recognition" by the Inventions Council of NASA.

In 1985 Professor Markatos was elected Professor of Chemical Engineering at the National Technical University of Athens, and in 1990 he was elected Head of the Chemical Engineering Department. In 1991 he was elected Rector of that University.

Professor Markatos' main scientific interest is in the mathematical modelling of Transport Phenomena, Fluid Mechanics, Thermodynamics and Physical Processes like Fluid Flow (Laminar and especially Turbulent), Heat and Mass Transfer, Environmental Flows, Combustion, etc.

He is referee of scientific papers, reviewer of new books, as well as member of the Editorial Board of several international Scientific Journals.

He has published over 100 original scientific papers in international journals and participated and organised many international conferences, seminars and meetings all over the world. Author of two books, he has also published many articles in the popular press on Engineering Higher Education.