4. GUIDELINES FOR THE TANNING INDUSTRY

4.1 INTRODUCTION

The IMPEL report on Minimum Criteria for Inspections published in June 1998 defines minimum criteria for various elements of the inspections such as planning, enforcement, analysis and reporting. It includes terms of reference for further tasks to be undertaken by IMPEL, including the subject of frequency of inspections. In this respect the "Inspections Cluster" of IMPEL Standing Committee 2 has prepared this report which was adopted during the IMPEL plenary meeting of 31 May to 2 June 2006.

The purpose task of this report is to provide inspectors with some useful elements to plan and perform an environmental inspection on a tannery, in accord with the national legislation and the IMPEL recommendations.

4.2 DIFFERENT APPROACHES TO ENVIRONMENTAL CONTROLS

Tanning consists of 3 distinct phases: wet phase (beamhouse and tanning), dry phase (mechanical operations) and refining. The possibility of separating the single phases and the need for specific raw materials for each phase has, in some countries, prompted the tanning enterprises to concentrate facilities in areas that subsequently developed into industrial districts.

This is also due to the necessity to contain the problem of smell that has afflicted tanning activity for a long time and has only recently been solved.

Where space allows or due to historical development, mid- to large sized plants perform the complete tanning cycle, from the raw material to the finished product. But not necessarily, there are also single plants with an incomplete cycle.

Such differing situations require specific approaches in terms of environmental controls.

The booming economy of past years has almost everywhere multiplied activities with environmental impacts, so that the gap between the need for environmental control and controls really made by competent authorities has greatly increased.

Thus, the traditional site-specific control eventually gave way to an indirect control allowing for a higher level of environmental protection.

An indirect approach for clusters of tanneries in a district essentially considers the district as a single tannery impacting the nearby environment.

Following the evaluation of every single aspect, the control authority produces a list of priorities which reflects the local environmental emergencies. This ranking helps the set up of a programme of controls and actions, whose effects are measured by continuous environmental monitoring.

The programme aims to reduce the district's general environmental impact to an acceptable level. Besides, there have to be site specific environmental controls occasionally.

The site specific approach of control allows for a comprehensive evaluation of the performance of each plant, and for a higher level of cooperation between inspectors and plant managers. The intent is to check the application of best available techniques, to select the best possible improvements, specific for the plant and the environmental performances it has to reach.

Site specific controls are in fact integrated controls. They evaluate the plant's overall performance without separating controls from environmental aspects.
The following tables detail the possible control type.

Indirect approach	**Site specific approach**
Many plants in district area	Few or isolated plants and occasionally in plants of a tanning district
Incomplete cycle plants	Complete cycle plants and incomplete cycle plants
Monitoring quality of each environmental aspect	Monitoring environmental performance of the single plant
Single environmental aspect inspections	Integrated inspections
Face environmental emergencies and routine activities	Face routine control activities

The authority responsible for environmental inspections has to opt for one of the two possible approaches, considering the number of plants; their concentration or spacing; the probability of emergencies; the resources at hand.
An exclusively site-specific programme is certainly best and is essential for checking the application of best available techniques. An indirect approach however is more apt to optimize limited resources when specific problems such as odours or specific pollutants are released to the air by clusters of facilities.

4.3 DEFINITION OF THE INSPECTION.

Art.II, 2 of Recommendation 331/2001/EC reads that an "**environmental inspection**" may include:

"a) checking and promoting the compliance of controlled installations with relevant environmental requirements set out in Community legislation as transposed into national legislation or applied in the national legal order (referred to hereinafter as "EC legal requirements"):

b) monitoring the impact of controlled installations on the environment to determine whether further inspection or enforcement action (including issuing notification or revocation of any authorisation, permit or licence) is required to secure compliance with EC legal requirements;

c) the carrying out of activities for the above purposes including:

---site visits,

---monitoring achievement of environmental quality standards,

---consideration of environmental audit reports and statements,

---consideration and verification of any self monitoring carried out by or on behalf of operators of controlled installations,

---assessing the activities and operations carried out at the controlled installation,

---checking the premises and the relevant equipment (including the adequacy with which it is maintained) and the adequacy of the environmental management at the site,

---checking the relevant records kept by the operators of controlled installations."

Thus, a check or control consists of appropriate actions to prove that there is compliance with legal and regulatory requirements. Control should not be intended as a "stand alone" activity, its aim is to be a direct assessment of activities, operations and behaviours likely to have an environmental impact.

The BREF on general principles of environmental monitoring (one of the reference texts produced by the EIPPCB- European Integrated Pollution Prevention and Control Bureau) provides the following definition for "monitoring": *"systematic surveillance of the variations of a certain chemical or physical characteristic of an emission, discharge, consumption, equivalent parameter or technical measure etc. This is based on repeated measurements or observations, at an appropriate frequency in accordance with documented and agreed procedures, and is done to provide useful information."*

The concept of control is therefore inclusive of that of monitoring, but also includes additional specific activities. A single mandate for example, can generate a considerably long checklist to be verified in the inspection.
In our example, control activities on tanneries include both monitoring of emission, discharges and waste produced by the plant but also some controls on technical aspects and operational procedures that are specific for this production cycle (i.e. the management of discharge water coming from beamhouse and from tanning;)
Given the above clarifications, we can now give a precise definition of the meaning of environmental inspection, as well as of the controls it includes.

Environmental inspection:
A check of the requirements specified by the environmental permit, and of the application of best available techniques for pollution prevention and reduction. The check, carried out within the framework of the existing environmental laws, consists of one or more of the following controls:

Administrative control: a documental check exclusively. It omits measurements, sampling, analyses. Its purpose is:
---checking compliance with the relevant environmental legislation in force;
---checking and promote the compliance with the relevant environmental requirements specified by construction and operation permits;
---checking the relevant records kept by the operators of the controlled installations.

Technical control: check on site the compliance of the building and contained installations, with the relevant environmental standards. Such spot checks measure and assess the functioning and safety of the components of the installation. The control in question is a check on the structural conditions of the installation.

Operational control: check and assess on site the compliance of self monitoring (and connected activities) with the relevant operation- and safety master plans. The Community law has recently highlighted the importance of continuous monitoring and in particular of self monitoring carried out by or on behalf of operators of controlled installations. The control in question is a check of performance of the installations .

The Bref on general principles in environmental monitoring defines self control as "*monitoring of industrial emissions by the operator of an industrial installation, according to an appropriate, defined and agreed sampling programme and according to recognised measurement protocols (norms or demonstrated analytical methods or*

calculation/estimation methods). Operators may also contract an appropriate external body to perform the self-monitoring on their behalf"

Analytical control: actual monitoring of the environmental impact of the installation, to guarantee its compliance with the relevant environmental requirements. Such controls almost always include sampling and subsequent analyses or calculations.

Being precise about the variety of controls is particularly important where tanneries are concerned. We have already noted that plants are frequently specialized on sections of the full tanning cycle (i.e. beamhouse and tanning, mechanical operations or finishing).

We advise to adjust the "integrated environmental inspection" to one specific segment of the complete tanning cycle, and to its specific environmental aspect. The inspector will then consider the actual cycle of the plant and inspect.

TYPE OF PLANT	ENVIRONMENTAL ASPECTS
Complete cycle	Air emissions and odours Water cycle (consumption, treatment and discharge) Solid and liquid waste Energy consumption (reuse of waste heat) Chemicals (use and storage) Environmental Risks Noise Raw materials
Tanning plant	Air emissions and odours Water cycle (consumption, treatment and discharge) Solid and liquid waste Energy consumption Chemicals (use and storage) Environmental Risks Noise Raw materials
Mechanical operation plant	Air emissions (powder) Solid waste Energy consumption Noise
Finishing plant	Air emissions and odours (solvents)

	Solid and liquid waste Energy consumption Chemicals (use and storage) Env. Risks

4.4 PLANNING AN INSPECTION

The inspection plan can be carried out according to the IMPEL guidelines (RIF) in terms of competences, resources and frequency.

The chief inspector will first decide whether the inspection will be integrated or specific. This should certainly be included in the authoritys plan of inspections, together with instructions on how to perform inspections and a list of the plants subject to controls.

The next step is collecting general information on both the plant and the surrounding environment:

- results of previous inspections, requirements, results of analytical controls,..
- integrated or single aspect permits, project of the plant, possible recent changes in the activity, technical description of air and water treatment,…
- self-monitoring reports, risk assessment
- surrounding environment (soil, surface and ground water, towns and vulnerable points)
- results from environmental monitoring: air quality (VOC, H2S, NH3, odours), water quality (surface water where plant discharges), level of noise,…
- results from audits of E.M.S.
- complains, environmental accidents

If the control of specific environmental aspects is the object of the inspection, the data examined have to be consistently specific (for example, data on noise do not help in measuring air emissions). If an integrated inspection is the case, data on various aspects will instead help understand the critical aspects of the plant and surrounding environment, and allow for an appropriate inspection.

The following paragraphs will describe some items that can help inspectors when planning an inspection:

--- a table to highlight the critical aspects of the plant. This should detail the production cycle and the environmentally sensitive aspects of the neighbourhood;

--- some tables giving details of the inspection activities which are adequate for the inspection of the existing production cycle and relevant environmental aspects;

--- advice on the specific checks to be realized during the inspections.

4.5 IDENTIFICATION OF CRITICAL ASPECTS OF THE PRODUCT AND PROCESS OF THE TANNING CYCLE

The table below lists the relevant components of the complete tanning cycle. It is a help for the inspector planning the identification of critical aspects in a tanning plant. Source: adapted from the BREF ”Tanning of hides and skins”.

Process Unit	**Waste water**	**Waste**	**Air emission**	**Energy consumption**	**Chemicals**	**Environmental Risks**	**Noise**
Hide and skin storage and beamhouse operations							
Trimming		• parts of the raw hidcs (trimmings)		For cooling systems of the storage drums			not particularly relevant
Curing & Storing		• salt brine				ground and surface water pollution, soil pollution	
Soaking	• BOD, COD, SS, DS from soluble proteins • salts • org - N • AOX • emulsificis. surtacants. biocides				relevant for use of hazardous chemicals (surfactants, biocides)	Soil pollution; Ground and surface water pollution	
Fleshing	BOD. COD. SS. DS from fat, grease	• fat, connective tissue, lime					
Liming & Unhairing	• sulphides, • BOD, COD, SS, DS• lime • high pH • org.-N, NH4-N, biocides	• hair • sludge from liming effluents (waste water treatment)	• sulphides • odour		relevant for use of hazardous chemicals (sulphides, Aliphatic thioles		
Rinsing after Unhairing							
Splitting		• lime split • trimmings					

Deliming / Bating	BOD, COD. DS • NH4.- N • sulphides, calcium salts		• NH3 • H2S • dust	energy consumption for all processes in drums reuse of waste heat for the heating of process water or elsewhere	relevant for use of hazardous chemicals (Ammonium salts)	ground and surface water pollution	relevant for use of drums
Rinsing							
Degreasing	• BOD. COD, DS, • organic contents	• distillation residues • waste water treatment residues	Organic solvents		Organic solvents, surfactants		
Pickling	• BOD. COD, SS, DS • Salt • low pH, fungicides		• H2S ■ acid fumes		relevant for use of hazardous chemicals (salt, acids, fungicides)		
Tanning	• contonts according lo tanning process - SS, DS. BOD. COD. low pH	• hides due to operating errors • tanning liquors • waste water treatment sludge			relevant for use of hazardous chemicals (e.g. chromium salts, polyphenolic compounds)		
Rinsing							
Draining. Samming & Setting							
Splitting & Shaving		• split and shavings • trimmings	■ dust				
Rinsing	• leather fibres from shaving						
Neutralisation	DS, SS; BOD. COD						
Rinsing							

Retanning	COD, formaldehyde, phenole, chromium				relevant for use of hazardous chemicals (e.g. mineral tanning agents, vegetable tanning agents)	ground and surface water pollution,	
Bleaching	• organic load		• SO2				
Dyeing	• high colour ■ organic solvents • dyeing agents	• residues of chemicals • dyeing agents	• NH3 • phenols • formaldehyde		relevant for use of hazardous chemicals (dyestuff)		
Rinsing							
Fatliquoring	• high oil • chlorinated organic compounds (AOX), surfactants				relevant for use of hazardous chemicals (chlorinated fat liquors)		
Finishing							
Staking / other mechanical operations		• dust		Drying is the most energy intensive process		use and storage of flammable substances	relevant
Drying			• acid fumes				
Milling / Buffing		• dust	• dust				
Coating	• finishing agents in water or in aqueous solutions (organic solvents, heavy metals)	• residues from chemicals • sludges from finishing agents (over-spray, etc.)	• organic solvent • formaldehyde as fixing agent		Organic solvents, formaldehydes		
Trimming		• final trimmings					
Abatement							

Air abatement	• waste water from wet-scrubbers	• sludges from waste water from wet-scrubbers • filter matrices • dust	• not abated emissions				
Waste water abatement		• sludges • coarse material • filters (e.g. from special treatment)	• according to waste water stream and process (e g. sulphides, ammonia. odour)	Reuse of waste heat			
Waste treatment	• according to waste fraction and process	• according to waste fraction and process	• according to waste fraction and process (particularly for beamhouse wastes: flesh, hair, fat,…)				

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4.6 DEFINITION OF THE SPECIFIC CONTROL ACTIVITIES.

The tables below list the possible controls ranked in accordance with the existing regulations, i.e. the control requirements of the Community law; the existing specific laws and technical considerations; the consolidated procedures.

Differences between IPPC- or non-IPCC installations are not taken into account, for the following reasons:
---many national legislations ignore differences in control activities when the two installations are concerned;
---annex1 of 61/96/EC defines the IPPC tannery as one that produces a certain daily weight of finished hides and skins. But the chromium tanning industry in some member states quantifies the finished product in terms of surface. In conclusion in this case it is not possible to specify if a tannery is an IPPC plant or not. Moreover tanneries products frequently leave the installation in wet form ("wet blue"), and consequently weigh considerably more than the final product. A conversion factor is needed to convert wet blue into leather for tanneries producing wet blue only.

Analyses of emissions of sections finishing leather with VOCs, include controls of exhaust air as well as of raw materials so as to assess their VOCs' content and define the solvents mass balance. Controls on raw materials may be requested by specific requirements.

Where most or all of the discharge waters are piped to municipal sewers, controls largely concentrate on the municipal waste water-treatment plants (wwtp). But some substances which can't be treated by the wwtp have to be treated on-site. These substances have to be monitored at the plant according to the requirements of legislation. In tanneries that do not pipe discharge water to municipal sewage facilities –and thus may heavily impact the acquatic environment- the frequency and peculiarity of controls is decided by the inspection authority on the basis of specific national legislation.

Technical or operational controls (Specify if BAT has to be in operation, i.e. tannery is in the IPPC class)						
	Water discharge	**Waste**	**Air emission**	**Energy consumption**	**Reagenti**	**Rischi ambientali**
General aspects	Global annual amount (one annual measurement) of water input and output Check the documentation of the self-monitoring	Indication of the annual quantity for each type of waste/byproduct chemicals, specifying if destined to recover/digestion. Check if containers, pallets, plastic or cardboard trunks, packagings, are recycled/re-used	Check existence and updating of logbook of self monitoring of relevant air emissions, and its compliance with prescriptions of the authorization.	Record consumption of electricity and heat (by measuring consumption of vapor, methane, diesel, oil BTZ, other sources). Identify indexes for the energy performance. Monitor the energy efficiency, inclusive alarms signalling malfunctions.	Indicate the annual quantity of raw hides and skins treated (full cycle). List countries of origin of raw hides and skins. Indicate quantity of half-finished hides or skins (wet-blue) treated, when coming from other plants. Indicate quantity of skins ended chemicals (expressed in mq for the cycle to the chrome and in tons for the production of leather). Indicate annual quantity of every chemical used	

Beamhouse	Check devices for the prevention of formation of H_2S in the S-containing waste water flow	Indicate final destination (recovery or disposal) of each waste or chemical byproduct produced in this phase (skin, salt, etc). Detail if flesh is recovered in gelatine, glue, hydrolysed proteins, fertilizers.	Check devices for the prevention of formation of H_2S		Check the use for utilization of chemicals chemicals with low environmental and toxicological impact. Check reductions of sulphurs by substitutes compatible with the product. Check reduction of salt used and its recovery. Check substitution of biocides with less impacting alternatives	Check presence of drains and of devices to contain spillages from drums, tanks and trunks containing chemical substances.
Tanyard	Check segregation of discharge flows containing chrome from other discharges, and their fitting with chrome recover devices	Indicate final destination (recovery or disposal) of each waste or chemical byproduct produced in this phase (skin clips, sludge, leather, etc). Check crusts chemicals, clips, shaves are recovered/re-used for the production of leather, fertilizers. Check if	Comparison between emissions authorized with measured emissions. Compare existing abatement device with described plan. Check characteristics of chimneys. Presence on drum aspiration line of water traps, abatement tower. If the abatement is		check substitution of ammonium salts with alternatives, and of virgin chrome with recycled. Centralized Installations for the Recover, ammonia with auxiliary like the penetrating for the colour. Check enhancement of exhaustion of post-tanning treatment	Check presence of devices for drainage and containment of spills from drums, tanks and trunks containing chemical substances. Check fire devices in proximity of storage areas

		fats, mix -non organic solvents, oils, are treated thermally.	wet, to verify procedures for self monitoring of pH and potential Redox of the solution of abatement (Environmental System Management).		agents for colouring and weight gain. Utilization of chemicals to low inorganic utilization of salts, colouring liquid to high exhaustion with little quantity of salts. Increase exhaustion of the bath of gain weight.	
Mechanical operations	Check correct destination of waste water	Indicate final destination (recovery or disposal) of each waste or chemical by product produced in this phase (skin clips, flesh, shaves, etc). To verify if crusts not tanned, clips, pluck are recovered/re-used for the production of leather, fertilizers. Check pluck, wool are recovered to produce furniture, fertilizers.	Compare real emissions with authorized emissions. Compare existing abatement device with described plan. characteristic chimney.			

Finishing	Check correct destination of waste water	Indicate final destination (recovery or disposal) of each waste or chemical by product produced in this phase (skin clips, sludge,etc). Check if organic solvents are treated for recovery. Check if carbon filters are treated for regeneration.	Compare measured emissions with authorized emissions. Check list of machinery used in finishing (sprayers, flatteners, smotherers, benches plugging, etc). Check existing abatement device with description (wet, dry, etc), characteristic chimney.		Check use of bindings based on low monomer content emulsions. systemize finish that use free pigments from cadmio/lead, solvents free, colouring liquid to high exhaustion with little quantity of salts, cylinder finishing, guns HVLP, systems to spray with veil of water and soda . Substitute halogen containing colouring agents with reactive vinyl sulfonici.	Check presence of devices for drainage and containment of spills from drums, tanks and trunks containing chemical substances. Check fire devices in proximity of storage areas for resins, solvents etc.
Check procedure of selfmonitoring of pH, potential Redox of the abatment solution (Environmental System Management).		Check presence of logbook of maintenances on abatement devices for significant emissions, and its compliance with prescriptions in the authorization. The logbook has to report each interruption of operation and each			Check the use of soda/oxygenated water solutions in abatements.	

		intervention on the abatement device, specifying the cause (ordinary/extraordinary maintenance, ruin accidental, shut down of production, etc). Check				
check description of waste water treatment plant , receptor body, final destination. Check self monitoring procedures (Environmental System Management) of pH, potential Redox, oxygen concentration (if oxidation bath exists). Check drainages of meteoric waters and water supplies (wells, waterworks, surface waters). Check systems for water reductions and reuse; segregation of beamhouse discharge flow from the tanning one (low pH)	Indicate final destination (recovery or disposal) of each waste or chemical by product produced in this phase (sludges etc). Check if cleansing sludges are treated for anaerobic digestion, production of fertilizers, sprayed in agriculture	check foreclosing, put in aspiration and gas abatement presence inhaled from the final pozzetto grill. If the abatement is at damp, check to verify procedure self controls, pH, potential Redox of the solution of abatement (Environmental System Management).			check use of agents of clear-flocculation	

Waste management		Indicate final destination (recovery or disposal) of each waste or chemical by product produced in this phase (packagings, pallets, etc).			Check use of press on moisturizes in the flesh stocking	Check presence of spills and their management. If positive, check presence of containment devices avoiding contaminations of soil , layer, waters

Analytical controls						
	Water discharge	**Waste**	**Air emission**	**Noise**		
General aspects				measure the noise level (dBA) in the plant site square and immediately to the outside one of the plant, being derived from the activity of the same one, confronting the values pointed out with the limits of law. To want to identify the noisier sources to the inside of the business perimeter.		
Beamhouse						
Tanyard			If abatement device is absent, measure the chimney concentration of sulphur composts			

			(hydrogen sulphur, sulphur dioxide, ecc) and compare it with the authorized emission limits.			
Mechanical operations						
Finishing			If abatement device is absent, measure the chimney concentration of COV, PM10 and compare it with the authorized emission limits			
Air abatment			Measure the hydrogen concentration at the chimney sulphurized, COV, PM10 and compare with the authorized emission limits. Measure pH, potential Redox of the abating solution	measure the noise level (dBA) of aspiration-, compression-, pumping- devices etc.		
Waste water treatment	Measure concentration of pollutants; pH; potential Redox in water discharge; oxygen concentration (if oxidation bath		Measure the chimney concentration of sulphur composts and compare with authorized emission limits. Measure pH, potential Redox of			

	exists). Check if limits fixed by national laws (BOD, COD, SS, organic nitrogen, sulphur, AOX, ammonia, etc) for industrial discharge waters, are attained.		the abating solution			
Waste management		Analyse sludge samples if destined for agricultural use				

4.7 REPORTING OF INSPECTIONS.

In accordance with art. VI 2. of the Recommendation 331/2001/EC, inspection activities should be reported to the Authority who releases the environmental permits who can decide, on the basis of the report conclusions, to apply fines, sanctions or changes to the permit conditions. Report contents can be determined following the advices of IMPEL report on “Planning and reporting of inspections”; reports have also to be collected in a database and be made available to the public.