

	<i>Name of project</i>
	<i>INSPECTAN: environmental inspection guidelines for the tanning industry</i>

1. Scope

1.1. Background	<p>Within the framework of the activities related to the knowledge of the environmental pressure of industrial cycles, APAT has started, in 2002, a comprehensive study of the tanning sector. Tanning industry is extremely developed in Italy and accounts for about 8% of the overall hazardous waste production. The study is led by the Regional Agency of Venice (ARPA Veneto) with the participation of the ARPA Tuscany and ARPA Campania (the three major tanning districts in Italy). The study is funded by APAT. The study, together with the existing BREF on tanning, will provide the basis and information needed to perform the proposed project. Tanning industry is present in Europe in almost all Countries. Therefore, the interest in developing a set of environmental inspection guidelines is supposed to be widespread in Europe.</p>
1.2. Definition	<p>On the basis of relevant EU legislation (IPPC, EMAS, Water Framework Directive, ...), the BREF Tanneries and following relevant guidelines provided by the VI Environmental Action Plan, the INSPECTAN project will:</p> <ol style="list-style-type: none"> 1. Review current practices in the tanning industrial sector to identify specific environmental threats including atmospheric emissions, waste management and other routes which may lead to soil and water contamination. 2. Describe the process life-cycle of the most threatening pollutants handled by the industry (for example: Cr) to focus onto selected biogeochemical processes and exposure pathways which may help to quantify threats to the environment. 3. Assess the state of the art of environmental inspection of the tanning industry. 4. Define a set of environmental inspection procedures as a reference document for existing industrial plants in Europe (EU+AC). 5. Perform a review of industrial solutions which have been successful in reducing contamination and exposure risk.
1.3. Objective of project	<p>Provide a set of inspection guidelines based on the understanding of the main threats caused by the tanning industry.</p>

1.4. Products	<ol style="list-style-type: none"> 1. A report describing basic principles for understanding potential environmental threats caused by the tanning industry according to the commonest production methods utilised within the European Union including the Accession Countries, taking into account the BREF Tanneries. 2. A set of principles, guidelines and recommendations based on selected best practices and case studies which may go beyond minimum inspection requirements.
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2. Structure of the project

2.1. Participants	Member states and accession countries are invited to participate by sharing comments and exchanging knowledge.
2.2. Project team	Members of APAT, ARPA Veneto and ARPA Tuscany
2.3. Manager Executor	ARPA Veneto
2.4. Reporting arrangements	Distribute progress reports before each Cluster I meeting and prepare Power Point presentations to stimulate discussion and remarks during the meeting themselves. The final report will be presented for approval at an IMPEL Plenary Meeting.

3. Resources required

3.1 Project costs	<p>The calculation of Project costs implies 3 meetings (Venice, Florence and Rome). The cost of additional meetings possibly requested by the participants will be covered by each MS or AC countries.</p> <p><u>Meeting costs (estimation):</u></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding-left: 20px;">Travel costs (€ 750 x 3 meetings x 6 persons):</td> <td style="text-align: right;">13.500 €</td> </tr> <tr> <td style="padding-left: 20px;">Hotel costs (€ 150 x 2 nights x 3 meetings x 6 persons):</td> <td style="text-align: right;">5.400 €</td> </tr> <tr> <td style="padding-left: 20px;">2 Coffee breaks (€ 10 x 2 days x 3 meetings x 15 partecipants):</td> <td style="text-align: right;">1.800 €</td> </tr> <tr> <td style="padding-left: 20px;">Lunch (€ 50 x 2 x 3 meetings x 15 partecipants):</td> <td style="text-align: right; border-bottom: 1px solid black;">4.500 €</td> </tr> <tr> <td style="padding-left: 20px;">TOTAL estimated meeting expenses</td> <td style="text-align: right;">25.200 €</td> </tr> </table> <p style="margin-top: 20px;">Total cost to be funded by the Commission 25.200 €</p>	Travel costs (€ 750 x 3 meetings x 6 persons):	13.500 €	Hotel costs (€ 150 x 2 nights x 3 meetings x 6 persons):	5.400 €	2 Coffee breaks (€ 10 x 2 days x 3 meetings x 15 partecipants):	1.800 €	Lunch (€ 50 x 2 x 3 meetings x 15 partecipants):	4.500 €	TOTAL estimated meeting expenses	25.200 €
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2.2. Financed from Commission	12 months 25.200 €
3.3. Financed from Member State	Dinner and additional meeting costs, if requested by the participants

3. Quality review mechanisms

In Italy

The participants and the project team will work in close collaboration in the definition of questionnaires and preliminary reports. This will provide the backbone of the Project Report and give the necessary orientation for the outline of the guidelines of inspection procedures. The first draft of the Report and the guidelines will be widely circulated among participants (inspectors in particular) and stakeholders. Their comments will be collected and addressed in the next draft versions.

Within the group of participants to the project

Project outputs will be disseminated both by e-mail and through presentations to be given during periodical meetings (meetings by the working group and Cluster 1 meetings). The draft form of the report will be circulated in the circa network, so open discussions will be promoted to stimulate comments and expand project scope to include the concerns and the interests of a wide range of conditions to try and produce an output relevant to a wider European readership.

IMPEL Evaluation

Presentations within Cluster 1 meetings will constitute a crucial evaluation step. Drafts will be circulated by e-mail.

4. Legal base

5.1. Directive/Regulation/ Decision	Recommendation 2001/331/CE Environmental Inspection VI Environmental Action Plan Dir 2000/60/CE Water Framework Directive Dir 96/61/CE IPPC
5.2. Article and description	VI EAP, Charter 2.1 Actions to be taken in exchange of best practice WFD ... IPPC ...

5. Project planning

6.1. Approval	The Project has been presented for adoption at the 22 nd IMPEL Plenary in Rome in November 2003.
6.2. Fin. Contributions	The Commission will contribute 25.200€ (approximately)
6.3. Start	September 2004
6.4. Meetings	3 meetings
6.5. Product	<ol style="list-style-type: none">1. First interim report by January/May 20052. Inspection procedures draft guide lines by May 20053. Final Project Report by December 2005
6.6. Adoption by IMPEL	27 th IMPEL Plenary Meeting in June 2006

INFORMATIONS ON THE PRODUCTION COMPARTMENT PROCESS

- 1) Define the number and dimension of the tannery industries in your country, distinguishing, if possible in:
 - a) Number of *plants* with a complete cycle (from raw material to finishing);
 - b) Number of *plants* with only tanning operations;
 - c) Number of *plants* with only finishing operations;
 - d) Number of *plants* with only auxiliary activities (third party mechanical operations);
- 2) Describe the geographical dislocation, whether single plant or cluster plants in districts.
- 3) Define the annual quantity of the finishing skins in m^2 . Give some statistical indication on the principal sectors of destination of the final products (clothing, shoes, furniture, etc.).
- 4) Indicate the type and provenience of skins used.
- 5) Indicate the annual consumption of solvents used in the entire production cycle of the finishing operations.
- 6) Indicate the annual consumption (type and quantity, expressed in kg) of the principal chemical substances used in the skin treatments/processes.
- 7) Define the water consumption (per year in m^3 for each tannery), specifying the provenience (well, ground water, aqueducts, etc).
- 8) Indicate the energy consumption used in the tanning process, describing the different types used (methane, combustible oil, electric energy).
- 9) Define the annual quantity (and the year of reference) of the organic and chemical parameters present in the waste water effluents:

Parameters	Amount and Year
COD (kg)	
SS (kg)	
Chlorides (kg)	
Sulphide (kg)	
Sulphate (kg)	
Total chrome (kg)	
TKN (kg)	
Flow (m^3)	

- 10) Define the quantities of air emission substances:

Parameters	Amount and Year
Sulfurous acid (kg)	
VOC (kg)	
Particulate (kg)	

- 11) Give an indication (number and localization) and description (treatment capacity and technology used) of the waste water treatment plants; indicate if the waste water from tanneries is treated apart or mixed with civil waste water.
- 12) Indicate the annual amount of sludge produced by the waste water treatment from tanneries and its final destination.
- 13) Describe the eventual treatment and/or recovering plants of the by-products (ex. *Carniccio*).
- 14) Indicate the waste treatment plants from the tanning process (numbers, localization, type of waste treated, type of treatment).
- 15) Indicate the technology used for the abatement of odours.
- 16) Indicate the number of claims for odour nuisance.

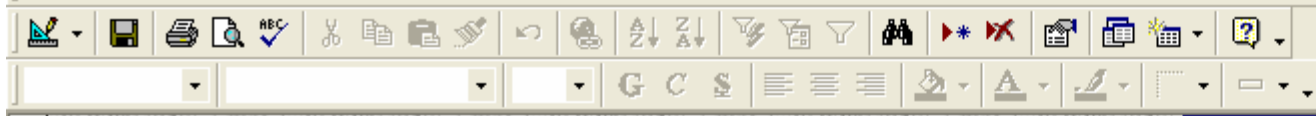
INFORMATIONS ON LEGISLATIONS

- 1) Describe the national codes and standards on tannery
- 2) Define the permitting system, for IPPC plants non IPPC plants.
- 3) Describe the codes and standards for the different environmental emission limits and treatment procedures (water, air, waste, sludge, etc)

INFORMATIONS ON INSPECTIONS

- 1) Indicate the responsible authorities for inspections
- 2) Define the types of inspection (technical, management of the plants, administrative...) and eventually the numbers of controls/inspections (latest date available).
- 3) Define the schedules of inspections
- 4) Define the fines and sanctions applied in case of violation of the legislations.

**Example of an electronic DATA-SHEET given by
ARPA Toscana**



ARPAT

Agenzia Regionale per la Protezione Ambientale della Toscana

Dipartimento Provinciale di Pisa
Servizio Locale del
Comprorio del Cuoio

OK

Arial 8 G C S

Preferiti Vai \\Monja\SCHEDA CONCERTIE\Data-sheet for tannery.mdb

COMPANY IDENTIFICATION

Denomination A 13/01/05



Authorization for working

N° of operators 60

Air emissions authorization terms according to the DPR 203/88 - Det. Prov. n° 185/1999

Location

Esemplio.apr

Industrial zone
 Residential zone
 Rural zone

Water waste authorization terms according to the Lgs.D. 152/99 and similar Rif. prat. N° 198/AS-SR/02

Raw hide or skin origin country Europa

Solid waste authorization terms according to the Lgs.D. 22/97 -

Hide or skin typology Bovino

Particular law prescriptions noticeable from authorizations

Emas

Iso 14001

CONTROLS



Arial 8 G C S [font icons]

Preferiti Vai \\Monja\SCHEDA CONCERTIE\Controls.mdb

CATEGORY AND KIND OF CONTROL

Denomination and date of inspection A 13/01/05



Category B

A Tannery with complete chromium cycle

B Tannery with complete vegetable cycle (Leather)

B1 Tannery with complete cycle for production of chrome and vegetable tanned skins

C Tannery starting from semi-tanned raw material (Wet Blue)

C1 Tannery with complete cycle for production of haired skins

D1 Tannery limited to the soaking and liming operations

D2 Tannery limited to the wet-work operations for production of Wet Blue

E Third party tannery limited to the operations of splitting, shaving, setting out (and all the other mechanical operations)

F Tannery limited to the spraying and varnishing operations

G Tannery with complete cycle for production of reptile skins

H Tannery not included in the previous categories

Kind of control Controllo globale

Frequency of controls

Inspector's name Mara Barbieri, Andrea Villani, Diletta Mogorovich, Rossella Frieri

Eventual sanctions





Denomination and date of inspection A 13/01/2005

VEGETABLE TANNAGE

Raw material (green hide) reception

Solid waste
By-pr.

Pickling

Air
Water

Retannage

Water

Shearing

Solid waste

Soaking

Water

Vegetable tannage in drum

Water

Dyeing

Air
Water

Buffing

Solid waste
Air

Liming and dehairing

Water

Pressing

Solid waste
Water

Fatliquoring

Water

Finishing

Solid waste
Air
Water

Fleshing

By-pr.
Air

Splitting in blue

Solid waste

Setting out

Air
Water

Trimming

Solid waste

Splitting in pelt

Solid waste
By-pr.

Shaving

Solid waste
Water

Vacuum drying

Air
Water

Finished skins

Deliming

Air

Washing

Water

Air drying

Air

Batting

Air
Water

Neutralization

Water

Staking

Solid waste



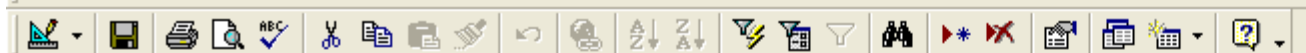


AIR EMISSIONS FROM DRUMS

AIR EMISSIONS FROM FINISHING

NOT VERY SIGNIFICANT AIR EMISSIONS





AIR EMISSIONS FROM DRUMS

Denomination and date of inspection: A 13/01/05



N° of the authorized vents: 3

Aut: 203/88

N° of the existing vents: 3

N° of drums under suction: 3

Kind of abatement: A umido

pH of the abatement solution: 13

Drops laying

Orientation of the chimneys: Dritti

Redox of the abatement solution: -520

Automatic batcher for the dosing of the abatement solution

Height of the chimneys: 8 metri

pH-meter for the abatement solution

Access to the chimneys in safety

RESULT OF THE CONTROLS: Soddisfacente

Autocontrol of pH: 12



AIR EMISSIONS FROM FINISHING

Denomination and date of inspection: A.13/01/05

FINISHING SPRAYING

N° of the authorized vents: 4
Aut: 203/88

N° of the existing vents: 4

N° of spraying lines for one booth: 1

N° of spraying lines for two booths: 1

N° of the spraying booths: 1

Kind of abatement: A umido

Orientation of the chimneys: Dritti

Height of the chimneys: 8 m

Access to the chimneys in safety:

RESULT OF THE CONTROLS
Soddisfacente

PADDING IMPREGNATION

N° of the authorized vents: 1
Aut: 203/88

N° of the existing vents: 1

N° of rolling coating unit: 2

N° of units for padding:

N° of rolling impregnation units:

N° of blooming units:

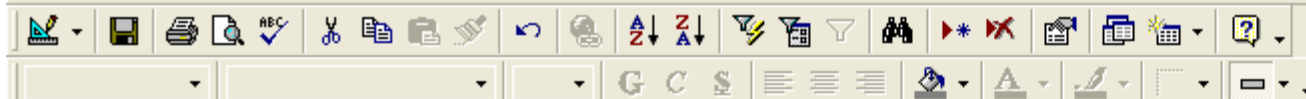
Kind of abatement: A secco

Orientation of the chimneys: Dritti

Height of the chimneys: 8 m

Access to the chimneys in safety:





NOT VERY SIGNIFICANT AIR EMISSIONS

Denomination and date of inspection A 13/01/05



N° of the authorized points of emission 3

Aut
203/88

N° of the existing vents 3

N° of the vents of the boilers

Kind of abatement

Other

N° of the vents of the drying tunnel

Kind of abatement

N° of the vents for air replacements 1

Kind of abatement A secco

N° of the vents of the grate wells

Kind of abatement

N° of the vents from the weighing units of chemicals and products 2

Kind of abatement A secco

RESULT OF THE CONTROLS





BAT FOR AIR EMISSION

Denomination and date of inspection A 13/01/05

Prevention of the generation of odours through process control, good housekeeping, proper handling and storage of raw hides and wastes, in some cases requiring the installation of filters, e.g. in the waste water pre-treatment plants

Wet scrubbing or bio-filters to abate ammonia and hydrogen sulphide from deliming, pickling and dyeing.

Wet scrubbing or bio-filters to abate VOC from degreasing, drying and finishing; incineration if economically convenient because of the very high concentration of solvents (e.g. drying of varnished skin)

Wet scrubbing, absorption or bio-filters to abate various air emissions from waste water pre-treatment plant

Suction of gas from drums (pickling) sent to the drop laying, tower of abatement with control of pH >12, Rx and automatic batcher of the abatement solution, final demister. Automatic control of the pollutant gases, if the sucked gases flowrate is more than 4000 - 5000 Nm³/hr

Covering and/or suction of the grate wells and final abatement of the sucked gases, with the maintaining of the pH of the abatement solution more than 12 (no carbonation effect). Avoid creation of closed areas, accessible to people.



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CATEGORY AND KIND OF CONTROL															BAT FOR PROCESS												
					VEGETABLE TANNAGE										BAT FOR CHEMICALS												
					HAIRD SKINS TANNAGE																						

WATER CYCLE

Denomination and date of inspection A 13/01/05



Accumulation tanks volume 190 mc

WASTE WATER

PRE-TREATING PLANT

Accumulation tanks suction

Partial waste water and discharge origin

Plant typology Vasche accumulo, chimico-fisico, sedimentatore

Grate Presente

Receiver body Fognatura nera

Control instruments installed and their Strumenti pH, Redox installati sulla linea di invio

Inspection well sealed

N° of wells 1

Control of pH 7,7

Autocontrol of pH

Final destination CUOIODEPUR

Control of Redox potential -15

Autocontrol of Redox potential



RESULT OF THE CONTROLS Molto soddisfacente. Nel 9/2004 in uscita dalle vasche di accumulo sono stati installati strumenti di pH, Redox al Servizio

Control of O2 concentration

Autocontrol of O2 concentration

METEORIC WATERS AND WATER SUPPLY



METEORIC WATERS AND WATER SUPPLY

Denomination and date of inspection A 13/01/05

METEORIC WATERS

WATER SUPPLY

Collection system meteoric waters Fognatura nera

From deep waters

N° of wells (from surface waters) 1

Acqueduct

Collection of waters in the receptive body Fognatura nera

Identification N°

Read value

Collection of waters to the waste water Fognatura nera

Depth

Location

Result of the controls



BAT FOR WATER CYCLE

Denomination and date of inspection

A 13/01/05



To improve the matching of water flow to the requirements of the process

To treat (on or off site) chromium-containing effluent with a concentration of $C_{rtotal} < 1g/l$ in combination with other effluents

To use batch versus running water washes

To recycle or re-use in the tannery process the waters from the centralized waste water treatment plant

To recycle or re-use process liquors where possible

To keep sulphide-containing effluent from the beamhouse separate from all the other effluents and at high pH until the sulphide is removed

To collect chromium-containing partial effluent with a concentration of $C_{rtotal} > 1g/l$ separately and send it to the Consorzio Recupero Cromo for chrome recovery



Denominazione e data sopralluogo A 13/01/05



KIND OF STORAGE

DESTINATION

KIND OF STORAGE

DESTINATION

CER: 130208 Oils for engines, gears and lubrication

Container

ECOMAR Collesalveti

CER: 150106 Miscellaneous packings

Container

WASTE RECYCLING

CER: 150102 Plastic packings

Raccolta differenziata

CER: 150110 Packings containing residuals of dangerous substances or contaminated from these

Container

WASTE RECYCLING

CER: 150103 Wooden packings

Altro Riutilizzo

CER: 150104 Metallic packings

Container

WASTE RECYCLING

CER:

RESULT OF THE CONTROLS

Soddisfacente per il livello di differenziazione e per la copertura delle zone di stoccaggio da acqua piovana



BAT FOR SOLID WASTE

Denomination and date of inspection A 13/01/05

Type of waste	Re-use, recycling, recovery, thermal treatment	Type of waste	Re-use, recycling, recovery, thermal treatment	Type of waste	Re-use, recycling, recovery, thermal treatment
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Splits	Leather and fertilizers production <input checked="" type="checkbox"/>
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Raw trimmings, green and limed fleshing	Proteic hydrolyzate, fertilizers <input type="checkbox"/>
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Hair, raw trimmings, green and limed fleshings, green and limed splits, fats, grease and oils; sludges from waste water treatment plant	Anaerobic digestion, fertilizers <input type="checkbox"/>
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Tanned wastes in general (e.g. splits, shavings, trimmings)	Leather fibre board and fertilizers production <input checked="" type="checkbox"/>
---	--

Raw and limed trimmings	Collagen, fertilizers <input checked="" type="checkbox"/>
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Fats, grease, mixtures of not-halogenated organic solvents and oil	Thermal treatment <input type="checkbox"/>
--	--

Splits and tanned trimmings	Small leather goods and fertilizers <input checked="" type="checkbox"/>
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Hair (for the nitrogen content), residuals from composting and anaerobic digestion, sludges from waste water treatment. The national legal requirements for the application of waste to land must be respected.	Agriculture and fertilizers <input checked="" type="checkbox"/>
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Organic solvents (no mixtures)	Recycling of organic solvents <input type="checkbox"/>
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Hair and wool	Filling material, wool and fertilizers <input type="checkbox"/>
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Activated carbon filters	Regeneration of air abatement filters <input type="checkbox"/>
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Raw trimmings, green and limed fleshings and splits	Gelatine, hide glue and fertilizers <input checked="" type="checkbox"/>
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Hair, green and limed fleshings, limed and tanned splits and shavings, fats, grease and oils; sludges from waste water treatment	Composting <input type="checkbox"/>
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Containers, pallets, plastic, cardboard	Re-use and recycling of packaging material <input checked="" type="checkbox"/>
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Untanned splits	Fertilizers <input checked="" type="checkbox"/>
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CATEGORY AND KIND OF CONTROL															BAT FOR PROCESS									
					VEGETABLE TANNAGE																			
					HAIRD SKINS TANNAGE										BAT FOR CHEMICALS									

BAT FOR ENERGY

Denomination and date of inspection A 13/01/05 [up/down arrows] [icon]

Recording of the actual energy usage, split by energy type and major end-uses, on a specified and appropriate regular basis (e.g. hourly, daily, weekly, etc.)

Setting, reviewing and revising of performance targets

Elaboration of energy performance indicators (historical energy performance or normalised to an indicator of production/external temperature/building occupancy etc.)

Monitoring of energy performance, including mechanisms to alert the operator to significant variations from predicted energy performance

Adoption of investigative and corrective actions, in response to variations

Delivering of concise, appropriate and timely energy performance information to all the individuals who are responsible for energy management



BAT FOR PROCESS

Denomination and date of inspection A 13/01/05



Curing and soaking

To replace partially or completely the ammonium salts with alternative chemicals

To use high-exhaustion chrome tanning method with the exception of the production of high quality hides

To enhance exhaustion of fatliquors

In the spraying systems, to minimize the finishing chemicals consumption using batcher with photocell

To reduce the amount of used salt as far as possible

Sheepskin degreasing

To maximize exhaustion of the vegetable tanning liquor using counter-current (tank tanning) or recycling (drum tanning) systems

Drying

To use spraying systems with water and soda veiling, maintaining pH >10

To recover the amount of used salt as far as possible

To optimize wet degreasing using surfactants, with or without organic solvents

To optimize mechanical dewatering prior to drying where possible

Unhairing and liming

Closed-circuit machines with air abatement when organic solvents are used to degrease skins in dry state

Retanning, chrome fixation and neutralization

Finishing

To reduce the sulphide consumption as much as possible, replacing it with other alternative chemicals (compatible with the articles).

Pickling

To enhance exhaustion of post-tanning treatment agents and fixation of tanning agents in the leather

To use roller coating

Splitting

To use baths with absent or low-content chlorides, where it is possible

To use chemicals with low-content of inorganic salts

To use HVLP spray guns

To use the splitting in pelt, where it is possible.

Tanning

Dyeing

To use airless spray guns

To maximise the use of split

To increase the efficiency of the chrome tanning process through a careful control of pH, float, temperature, time and drumspeed

To enhance exhaustion of dyestuffs

Exceptions for three finishing techniques above:
* when very thin finishes are applied (e.g. skins with aniline)
*high quality leather production

Delimiting and batting

To recover chrome through seeding to the Consortium

Fatliquoring



BAT FOR CHEMICALS

Denomination and date of inspection A 13/01/05



Biocides

Products with the lowest environmental and toxicological impact, used at the lowest level possible

Surfactants APE and NPE

e.g. alcohol ethoxylates, where possible

High-exhausting dyes containing low amounts of salts

Substitution of ammonia by auxiliaries such as dye penetrators

Finishing systems that use cadmium and lead-free pigments

Other

Halogenated organic compounds

Substitution for soaking, degreasing, fatliquoring, dyeing and special post-tanning agents, with the exception of the cleaning of the merinos sheepskins

Complexing agents EDTA and NTA

EDDS and MGDA where possible

Substitution of halogenated dyestuffs by vinyl-sulphonated reactive dyes

Fatliquoring agents (fatliquoring emulsions)

Free of agents building up AOX, with the exception of the waterproof leather production

Water-repellent agents free of agents building up AOX, with the exception of the waterproof leather production

Water-repellent agents applied in organic solvent-free mixtures or, when not possible, low organic solvent mixtures

Organic solvents (not-halogenated)

Finishing:
* aqueous-based finishing systems. Exception: if very high standards of topcoat resistance to wet-rubbing, wet-flexing and perspiration are required
* to use finishing systems with low-organic solvents and aromatic content

Tanning agents Chromium Syntans and resins

20-35% of the fresh chromium input can be substituted by recovered chrome

Applied in organic solvent-free mixtures or, when not possible, low organic solvent mixtures

Water-repellent agents free of metal salts, with the exception of the waterproof leather production

Phosphate-based flame retardants

Chemicals with low formaldehyde, low phenol and low acrylic acid monomer, with the exception of the high quality hides production

High-exhausting to reduce the COD as much as possible

Finishing agents for topcoats binders (resins) and cross-linking agents

Sheepskins degreasing: the use of one organic solvent and not mixtures, to facilitate possible re-

Dyestuffs

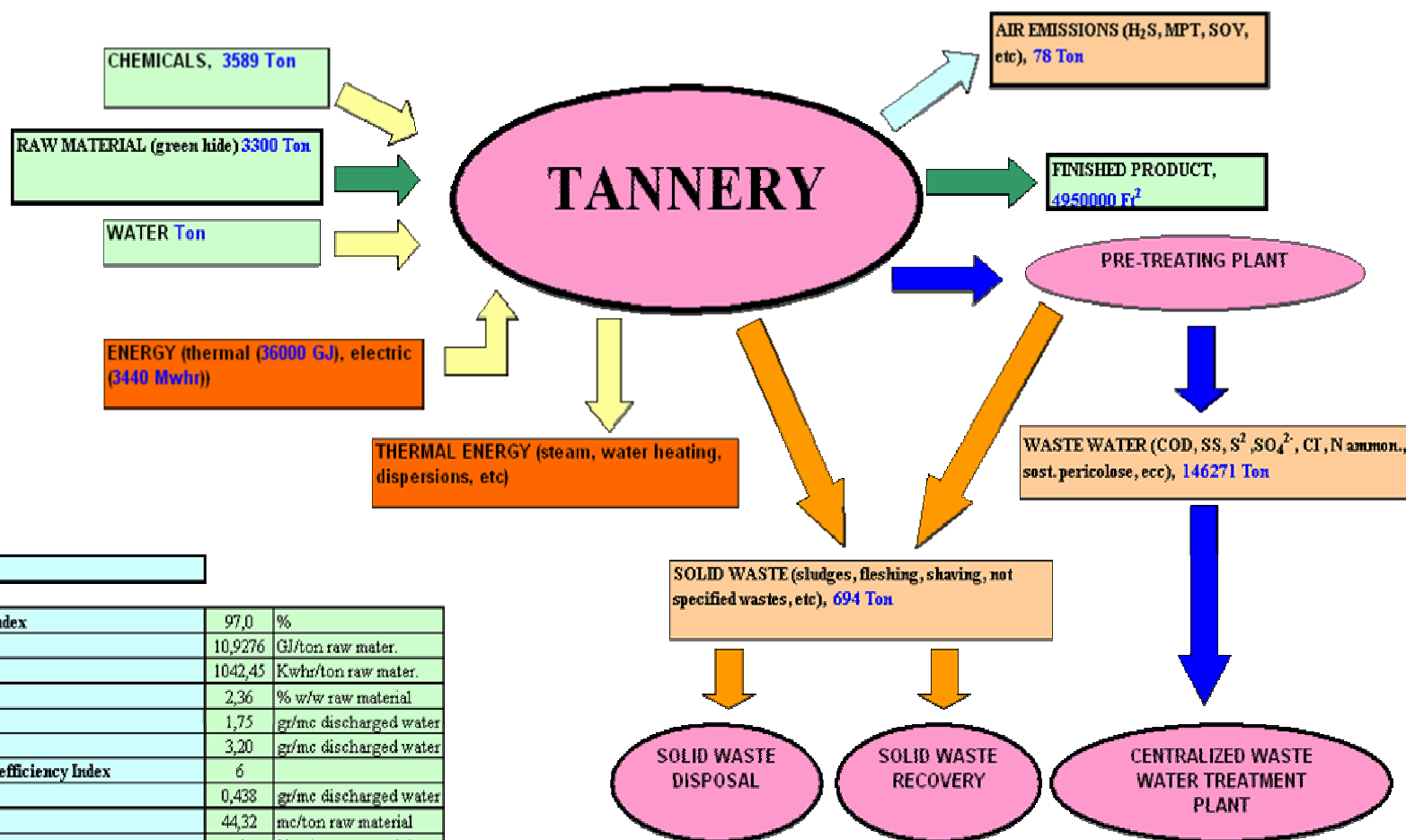
De-dusted or liquid dyestuffs

Binders based on polymeric



TANNERY ENVIRONMENTAL BALANCE

Tannery: B
 TOWN COUNCIL: FUCECCHIO
 CATEGORY: A

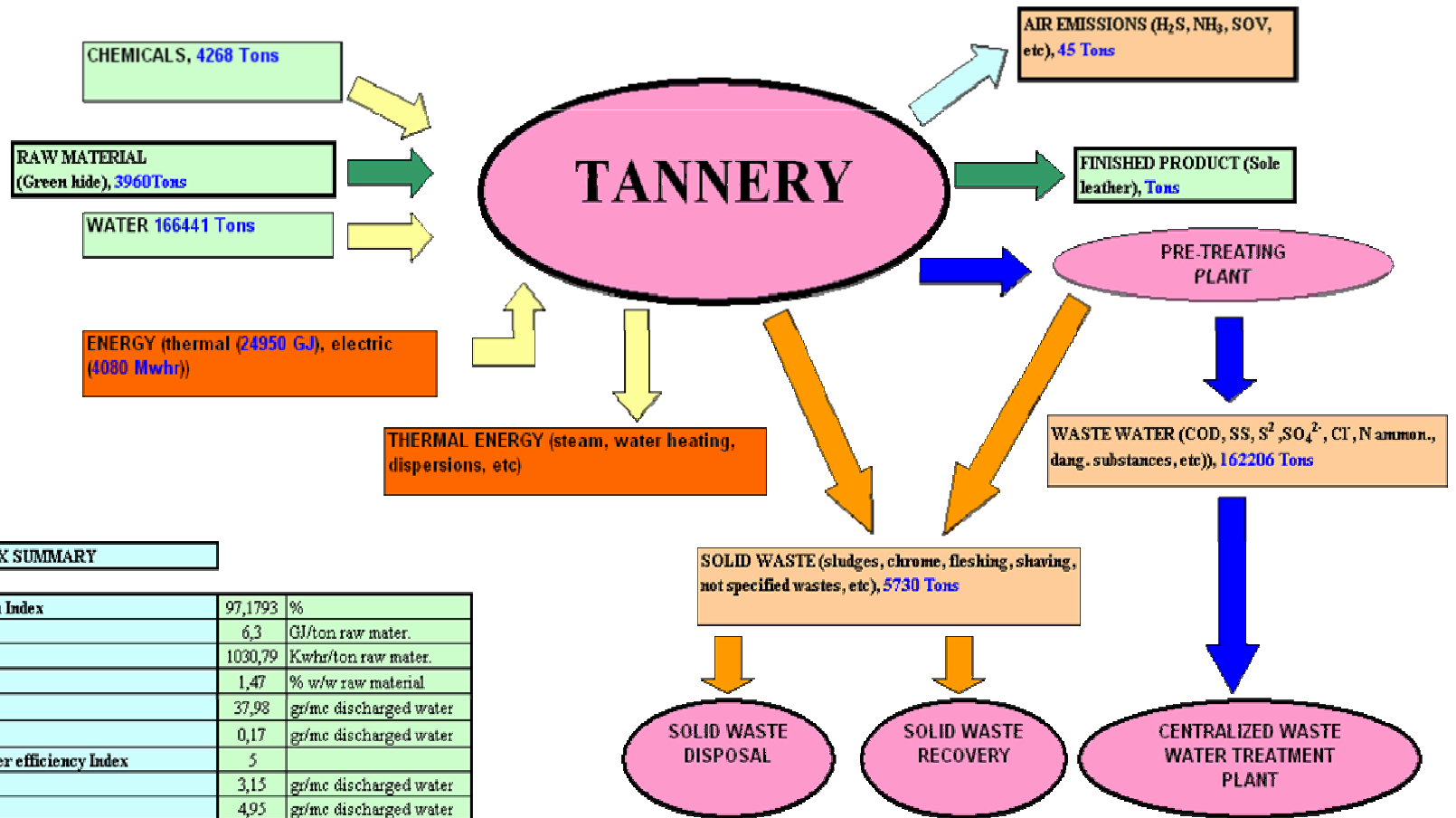


YEAR ENVIRONMENTAL INDEX

Methane/cogeneration utilization Index	97,0	%
Heat energy Index	10,9276	GJ/ton raw mater.
Electric energy Index	1042,45	Kwhr/ton raw mater.
Overall air emission Index	2,36	% w/w raw material
MPT emission Index	1,75	gr/mc discharged water
H2S emission Index	3,20	gr/mc discharged water
Pickle drums gas absorption tower efficiency Index	6	
SOV emission Index	0,438	gr/mc discharged water
Water consumption Index	44,32	mc/ton raw material
Bactericide use Index	/	% w/w raw material
Surfactant use Index	/	% w/w raw material
Anti-wrinkle chemicals use Index	/	% w/w raw material
Sodium sulphide use Index	16,67	% w/w raw material
Chromium use Index	11,18	% w/w raw material
Solvent use Index	2,66	% w/w raw material
Overall waste production Index	21,02	% w/w raw material
Sludge production Index	11,72	% w/w overall waste
Waste for recovery production Index	35,98	% w/w overall waste
Waste for disposal production Index	64,02	% w/w overall waste

TANNERY ENVIRONMENTAL BALANCE

TANNERY NAME: A
 TOWN COUNCIL: S. MINIATO
 CATEGORY: B



YEAR ENVIRONMENTAL INDEX SUMMARY

Methane/cogeneration utilization Index	97,1793	%
Heat energy Index	6,3	GJ/ton raw mater.
Electric energy Index	1030,79	Kwhr/ton raw mater.
Overall air emission Index	1,47	% w/w raw material
SO ₂ emission Index	37,98	gr/mc discharged water
H ₂ S emission Index	0,17	gr/mc discharged water
Pickle drums gas absorption tower efficiency Index	5	
MPT emission Index	3,15	gr/mc discharged water
SOV emission Index	4,95	gr/mc discharged water
Water consumption Index	42,03	mc/ton raw material
Bactericide use Index	/	% w/w raw material
Surfactant use Index	/	% w/w raw material
Anti-wrinkle chemicals use Index	/	% w/w raw material
Sodium sulphide use Index	2,73	% w/w raw material
Chromium use Index	/	% w/w raw material
Solvent use Index	0,06	% w/w raw material
Overall waste production Index	144,70	% w/w raw material
Sludge production Index	5,46	% w/w overall waste
Waste for recovery production Index	79,08	% w/w overall waste
Waste for disposal production Index	20,92	% w/w overall waste