ILC PROJECT

ENGINEERING DESIGN REPORT

CFS Europe – KICK OFF MEETINGS

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From LHC TO ILC, Environmental aspects

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From LHC TO ILC, Environmental questions

SUMMARY

1. Introduction

- *Environmental issues now a fundamental aspect of large scale projects (some areas being more "sensitive" than others)*
- *Standards in all countries getting more restrictive year after year*
- *Measures to mitigate nuisances both at construction and operation stages are a non negligible part of the overall budget*
- *If not handled properly and in due time, they may lead to delays, unexpected changes, budget overruns…*

2. Main CE quantities

Comparison between LEP, LHC and ILC Projects

	LEP	LHC	ILC (phase 1)
• Number of shafts	19	6	15
• Number of underground chambers and caverns	37	32	38
• Length of tunnels of all sizes	32,6 km	6,5 km	72.0 km
• Total number of buildings	70	30	133
• Total area of buildings	59 000 m^2	28 000 m^2	72150 m^2
• Total volume of excavation (in place)	1 100 000 m^3	420 000 m^3	2 380 000 m^3
• Volume of concrete for underground works	230 000 m^3	125 000 m3	616 000 m^3
• Volume of concrete for surface structures	85 000 m^3	42 000 m^3	106 000 m^3

3. Why an Impact Study for Projects on French Territory

- *It is a legal obligation (medium + large scale Projects)*
- *It is compulsory to get the Déclaration d'Utilité Publique / DUP (signed by the prime Minister)*
- *DUP is a prerequisite to building permits application*
- *I.S. is used as a basis to inform the local populations during the Public inquiry procedure*
- *I.S. is used as a reference during and after implementation of the works*

(For LHC only one Impact Study covering all aspects of the Project to both the French and Swiss Authorities)

4. Contents of the LHC Impact Study (1)

4. Contents of the LHC Impact Study (2)

5. The Management of the works

5.1 Generalities
5.2 Underground works
5.3 Surface works
5.4 The work site plants

6. The Environment in its original state

6.1 Geography
6.2 Weather conditions
6.3 Geology
6.4 Earthquakes
6.5 Hydro-geology
6.6 Waters
6.7 Air quality
6.8 Initial radiological state
6.9 Initial chemical state
6.10 Waste disposal
6.11 Noise
6.12 Existing quarries In Pays de Gex
6.13 Flora
6.14 Fauna
6.15 Activities and land occupation
6.16 Patrimony

7. Impact of the LHC Project on the Environment

7.1 Reasons and consequences of the LHC choice
7.2 Méthodology for Impact evaluation
7.3 Construction phase : the work sites

4. Contents of the LHC Impact Study (3)

7.4	Operation phase : the completed structures
7.5	Visual impact
7.6	Radiological impact
7.7	Spoil treament
7.8	Waste treatment
7.9	Consequences on water resources
7.10	Noise and vibration
7.11	Transportation, traffic and road network
7.12	Electrical consumption
7.13	Land property impact
7.14	Impact on flora and fauna
7.15	Impact on safety
7.16	Socio-economical impact

8. Proposed measures to avoid, mitigate or compensate impacts

8.1	Buildings and their surroundings
8,2	Networks
8,3	Dump areas
8.4	Protection against noise pollution
8.6	Road improvements
8.7	Protection of water resources
8.8	Energy saving measures
8.9	Controls measures
8.10	Consequences of an earthquake
8.11	Cost of measures taken to mitigate environmental impact

5. Environmental nuisances and mitigation measures for LHC and ILC Projects (1)

Type of nuisance	Mitigation measures taken for LHC	Proposed mitigation measures for ILC
Visual, due to localisation of access buildings	Minimize the numbers of accesses and related buildings. Dumps and landscaping around buildings areas	Move general layout to be close to Genève-Lausanne motorway. Horizontal linking galleries to avoid villages of wineyards in certain cases
Central campus buildings impact	No new central campus	Select a zone with existing forest on two sides and few nearby houses
Visual impact of industrial type buildings in general	Systematic use of Architects, consult with local Authorities, reduce height, plan trees around…	Systematic use of Architects, consult with local Authorities, reduce height, plan trees around…CMS assembly hall to be lowered and shortened after use
Spoil from underground works disposal	Spoil smoothly disposed around two sites and landscaping works once complete. Remaining of spoil under an HV electrical line in forest	Spoil smoothly disposed around main sites and landscaping works once complete. Excess of spoil to Constructors dumps if necessary

5. Environmental nuisance and investigation measures for LHC and ILC Projects (2)

Type of nuisance	Mitigation measures taken for LHC	Proposed mitigation measures for ILC
Lorries on local road network	Only minimum transport of spoil on local roads. No lorries at night outside CERN Pt5 site. New dedicated road across F/CH border	Only minimum transport of spoil on local roads. No village crossing as far as possible. No lorries at night
Cooling towers noise and plume	Use of noise attenuators on air inlet and motors. Reduce number of C. towers as far as possible	Use of hybrid type cooling tower (Dry Cooling unless temperature above 15°C). Use of noise attenuators
Noise	No surface works at night. Noise attenuators on equipment. Noise barriers and earth dumps around sites. All Concrete buildings with thick insulation material inside when housing noisy equipment	No surface works at night. Noise attenuators on equipment. Noise barriers and earth dumps. All concrete buildings with thick insulation material inside when housing noisy equipment

5. Environmental nuisance and investigation measures for LHC and ILC Projects (3)

Type of nuisance	Mitigation measures taken for LHC	Proposed mitigation measures for ILC
Water pollution	Systematic water treatment plants (construction and operation). Detectors. Boreholes to check quality of water table during the works.	Systematic water treatment plants (construction and operation). Detectors. Boreholes to check quality of water table during the works
Air pollution / dust	Use of water sprays and filters. Detectors around sites	Use of water sprays and filters. Detectors around sites
Electrical lines	All lines buried as far as possible up to medium voltage	All lines buried as far as possible up to medium voltage
General	Regular meetings with neighbours during construction. Paper / informatic information to the public	Regular meetings with neighbours during construction. Paper / informatic information to the public

6. Chronology of the Impact Study approval in France for LHC

	Start month	Activity
11 months	05.1995	• Impact study writing with the help of external Consultants and experts
_____	04.1996	• Sending of Draft 1 to the French Authorities (central and local)
12 months		• analysis of all comments received + discussions + modification
	12.1996	• Sending of Draft 2
_____	04.1997	• Analysis of comments received + discussions + modifications • Sending of final version, together with DUP application
15 months*	12.1997	• Public Inquiry • Analysis by the « Commission d'Enquête »
_____	07.1998	• Signature of « Déclaration d'Utilité Publique » (DUP) by French Prime Minister and official publication
TOTAL : 3 years and 2 months **		

* Including a five months delay for french P.M. signature (2 years and 9 months without delay in total)

** Overall duration has been 2 years and 3 months for the LEP Project

Overall foreseen duration is 2 years and 8 months in total on the ILC Technical Time Schedule

7. Conclusions

- *Impact study report will constitute an important part of the project*
- *Seeking and obtaining approval from concerned Authorities is generally a lengthy process, to be taken into account as such in the Project Time Schedule*
- *However a major part of it might be in the hands of the selected bidder depending on what he offers to take into account (likely with help from Consultants and experts)*
- *In Europe, a great deal of inspiration can be gained from the LHC Project, which was successful in adressing and solving environmental issues*
- *However, ILC Project spans more widerly into sensitive zones, to be investigated at early stages as far as possible*