
LHCC review of the ATLAS experiment INSTALLATION

- A review of the installation of the ATLAS experiment in the underground caverns at Point 1 of the LHC
- Two days 24-25 September 2002
 - Presentations by the management of the experiment on schedules, milestones and resources.
 - A visit to Point 1 and detector assembly halls
 - Evaluation and preparation of recommendations by the experts including an assessment of risks.

Membership of the Review Committee

- Chairman: R. Cashmore, CERN Director for Collider Programmes
- Representatives from the LHCC: W. Bartel, A. Ceccucci, J. Dainton, B. Lohr, T. Taylor, K. Tokushuku, K. Potter (rapporteur)
- LHCC Chairman and Secretary: M. Calvetti, E. Tsesmelis
- Representatives from the CERN Technical Sector: P. Ciriani, A. Scaramelli,
- CERN Technical Director: J. May,
- EP Division: D. Schlatter
- TIS Division : W. Weingarten
- External Reviewers: R. Kephart, P. Lazeyras

Aims of the Review

- Installation schedules and milestones, details of the planned activities
- Required resources and their origin, work packages
- Identify any potential risks for the installation and assess critical path items
- In particular:
 - survey and alignment
 - **safety**

ATLAS INSTALLATION

- Difficult and long
(3.5 years)
- Very large toroid
26m \varnothing by 46m long
- To be installed 100m
underground
- Cavern limited in size
- Ditto access shafts
- No large surface hall
- First-time operations
underground

THE ATLAS REVIEW

CONCLUSIONS

- The Review Committee was impressed by the amount of work which has already gone into the installation plan of the ATLAS experiment, but also has to draw attention to the fact that the installation will be long and difficult and a great deal of work remains to be done.
- The major concerns of the Review Committee, given below, are intended to allow the LHCC to follow up outstanding issues and to monitor future progress.

THE ATLAS REVIEW

CONCLUSIONS

- . It is recommended that the following issues should be addressed in greater detail:
 - detector services and cabling,
 - quality assurance and change control,
 - integration of services and work in USA15 into the general planning,
 - early installation of monitoring and control systems,
 - integration of the commissioning of each sub-detector, even if this is done during second and third shifts,
 - the 'work package' approach, including for cryogenic installation and operation,
 - availability of transport and handling resources,
 - occupancy of high risk areas, maximum numbers underground, safety and evacuation procedures,

THE ATLAS REVIEW

CONCLUSIONS

- More detector specific issues:
 - the final stages of the barrel toroid assembly when space is limited,
 - the 'functional test' of the barrel toroid as soon as assembled underground,
 - the use of cranes,
 - the solenoid field mapping,
 - the installation and associated tooling for all muon chambers,
 - inner detector services, including the high current conductors, cooling and gas pipes,
 - installation of the end-cap toroids,
 - safe, low risk access, for maintenance of the fully installed detector.

THE ATLAS REVIEW

CONCLUSIONS

- The over all planning has very few in-built contingencies and this will make the handling of any delays very difficult. However, ATLAS plan to complete installation by September 2006 and keep the remaining time for global commissioning and cosmic testing. This constitutes a reasonable reserve.
- The introduction of multi-shift working can be used to cope with some delays, but will often require additional resources and reorganisation of the funding. And will clash with the installation of services and the commissioning of detectors.

THE ATLAS REVIEW

CONCLUSIONS

- As far as it was possible to determine the present funding arrangements are commensurate with the plan as described.
- The Technical Coordination was judged to have this difficult task well in hand, but there is a considerable risk of schedule delays and an extraordinary effort is still required to ensure that ATLAS has a working detector ready for first collisions in April 2007.