1. Management

1.1. Project Organisation

The management structure for this project will consist of the following bodies:

Steering Committee (SC): This will be responsible for the day-to-day running and financial management of the project. It will ensure that the project milestones are being met, monitor the expenditure and make any corrections that are necessary. The Committee will consist of the PI (Juergen Pozimski (Imperial)) and the deputy PI (Alan Letchford (STFC)) and the task managers. It will meet on a monthly basis before or after the FETS meetings.

Executive Board (EB): Although this is now a separate project, many of the activities being undertaken originate in UKNF or have close connections to the other Accelerator R&D proposals. As a result, it is planned have a body, provisionally called the Executive Board, that will oversee the four proposed projects. The board will be chaired by Ken Long (Imperial) and the representatives for FETS will be the PI and deputy PI. The EB will meet about twice per year, will receive reports from each project and advise on progress and possible problems.

Task Management (TM): The project consists of 5 main tasks described in Section 2. Each of these is assigned a Task Manager (TM). The current list of these is shown in Table 1.1. The TM will be responsible for the day-to-day running and financial management of the task and will report on progress against milestones, deviations from the expected expenditure profile and problems to the SC.

Table 1.1: Work Packages and Work Package Managers

Work package	Description	Manager
1	Ion source development and beam delivery	Dan Faircloth (STFC)
2	RFQ commissioning	Juergen Pozimski (Imperial)
3	MEBT	Ciprian Plostinar (STFC)
4	Diagnostics	Christoph Gabor (STFC)
5	Furutre of FETS	Alan Letchford (STFC)

Project meetings: In addition to the monthly project and EB meetings already discussed, it is planned to hold general meetings of the four accelerator R&D projects being proposed twice per year, if approved, so that each project maintains a close collaboration with the others. This high power target project will hold meetings of all participants a further two times per year.

1.2. Cost & Financial Management Plan

The full costs for the project are shown in Annex 1. They are also summarised in Je-S. Only one ASTeC project number within the Shared Services Centre will be requested. It will be a main responsibility of the task leader to monitor the actual expenditure against expectation. The ASTeC financial team will provide tables of the expenditure on a monthly basis. These will be sent to the PI the Co PI and each of the task leaders and the latter will then report on this to the SC. The SC will ensure that action is taken to fix any significant deviations from the expected spend profile.

Approval will be required for all travel and hardware expenditure. Travel with a total cost of less than £1000 will need to be approved by the corresponding task manager. Travel costs above this limit must be referred to the PI by the task leaders. Hardware costs of less than £5000 can be approved by the task leader. Costs above this will need to be approved by the SC.

1.3. Schedule

The project is scheduled to last for 2.5 years. All of the WPs will continue for this duration, except for WP4, the Neutrino Factory solid target. As UKNF is in a managed withdrawal phase, we plan only to finish off the work already started and complete this in time for the International Design Study Reference Design Report due in 2013. As a result, this WP is scheduled only for the first year of the project.

As described above, a number of tasks have been defined for each WP and these have been used to create milestones. The schedule for the project has been defined in terms of these milestones and is shown in a Gantt chart in Figure 3.1

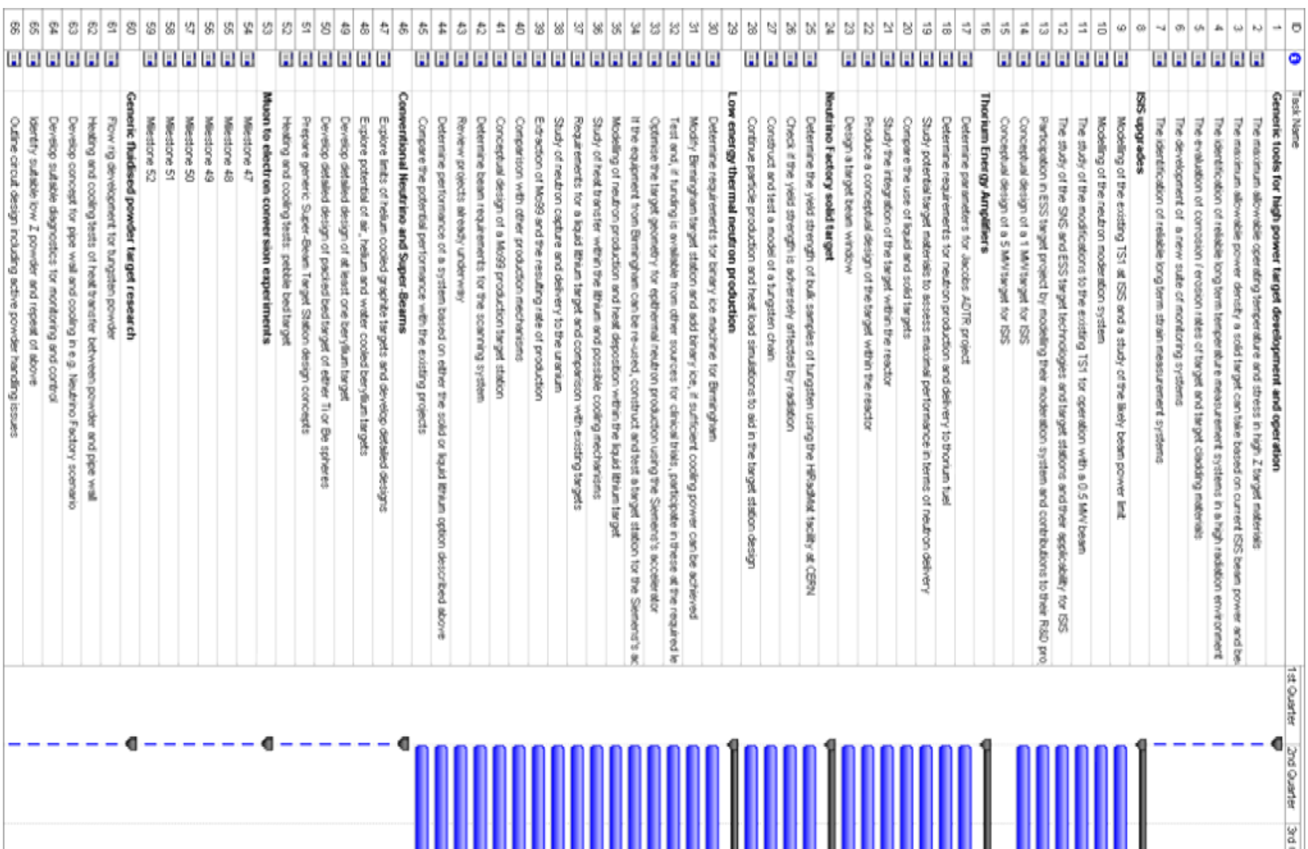

Figure 3.1: Schedule for the Project

1.4. Milestones

As described in Section 3.3, the milestones for the project have been created from the tasks defined for each WP. As this is an R&D project, these tend to be more detailed at the start and become more general as the project develops. The milestones are shown in for each WP in Annex 2 and are summarised in the Gantt chart of Figure 3.1.

1.5. Critical Path

This project consists of a number of R&D programmes on targets at or beyond the frontiers of current knowledge. The main aim is to identify and test possible routes forward, rather than delivering working target stations at this stage. As a result, the “critical paths” for the work are strongly related to the technical risks discussed in section 3.6 and shown in Table 3.2.

1.6. Risk analysis

Technical risk: An analysis of the main technical risks for each of the WPs is given in Table 3.2.

Table 3.2: Project Technical Risks

WP	Description	Likelihood (0-5)	Impact (0-5)	Risk	Mitigation
1	Not possible to identify reliable, long term target temperature measurement devices	1	2	2	Secondary methods, such as cooling water temperature, are currently employed and can still be used.
1	Not possible to develop complete set of systems for the online monitoring of targets	2	2	4	Develop and implement the systems that can be developed.
1	Not possible to identify long term strain rate systems for high radiation environment.	2	2	4	Develop systems for shorter term measurements, but ensure these can be replaced after failure.
2	Existing ISIS target cannot be easily modified to 0.5MW.	2	3	6	More significant changes required to achieve 0.5 MW.
2	1 MW ISIS target not possible.	1	4	4	Determine maximum possible beam power.
2	5 MW ISIS target not possible.	3	3	9	Determine maximum possible beam power.
3	Not possible to design beam window for 4 MW beam in an ADSR.	2	4	8	Determine what the maximum useable beam power is.
3	Not possible to implement 4 MW target within an ADSR.	2	4	8	Determine the maximum possible beam power.
4	Not possible to test tungsten in HiRadMat facility	1	3	3	Verification of bulk tungsten not possible for a Neutrino Factory
4	Yield strength of bulk tungsten not large enough.	2	3	6	Use alternative target technology for Neutrino Factory.
4	Irradiated tungsten too brittle	2	3	6	Use alternative target technology
4	Tungsten chain shown not to be feasible	2	3	6	Use alternative target technology
4	Target station shown not too be feasible with baseline parameters	2	5	10	Reduce beam power, capture solenoid magnetic field, etc, until feasible.
5	BNCT: binary ice cannot provide sufficient cooling.	2	5	10	Study alternative target layouts.
5	BNCT: funding not available for clinical trials	2	4	8	Demonstrate target feasibility and collaborate with others on clinical trials.

5	BNCT: Siemens accelerator does not work	3	3	9	Collaborate with IBA instead.
5	Moly99: beam current achievable with liquid lithium target too small	3	4	12	Study beryllium and other neutron production reactions.
5	Moly99: Mo99 extraction efficiency too small	2	5	10	Determine what is achievable for comparison with other possibilities.
5	Security: Proposed production methods cannot meet requirements	1	5	5	Stop studies.
5	Security: Proposed methods not competitive	2	5	10	Stop studies.
6	Proposed target technologies unable to meet requirements	2	4	8	Study more complex target types.
7	Proposed targets incapable of delivering physics goals	2	4	8	Investigate other target options.
8	Show-stopper found for powder jet target	2	5	10	Stop studies.

Financial risk: A number of the targets being studied in this project are in the early stages of development. Nevertheless, hardware will need to be purchased during the project to complete the work. There is, therefore, a risk related to the cost of this hardware. In all cases, the costs included are the best estimate of what will be required, but as this is an R&D programme, there are significant uncertainties. The biggest sources of risk are:

- WP1: An estimate has been made of the cost of the instrumentation and the testing that will be required. However, until the work starts, there is an uncertainty on what may meet the requirements and hence how much it will cost.
- WP4: The biggest hardware cost in this work package is the model tungsten chain. The manufacturing technique for this still has to be identified and hence there is an uncertainty on the cost of this manufacture.
- WP5: The biggest cost for this WP is the binary ice cooling machine for BNCT. Until the proof-of-principle experiments are finished, it is uncertain whether this technique will work and what the required cooling power will be, though modelling suggests it will work. The cost of the biggest binary ice machine has been included. It is likely that a smaller machine will be required and this cost will be less in reality.
- WP6: The hardware costs for this WP are to build and test, both offline and online, target options for Superbeam projects. The options to be tested and the scope of the tests depend on the outcome of the design work done beforehand. This leads to an uncertainty in the costs of these tests.
- WP8: The hardware costs are for the upgrade of the powder test rig. These upgrades will not be required if early tests find significant problems with the technology itself.

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