BOOSTER AGS MODIFICATIONS
RSVP Review Status Sheet

Date: 12/29/04 12:00 AM

WBS No. 1.4.1

Title: BOOSTER AGS MODIFICATION

Preparer/Manager: Kevin Brown

Current Cost Est.(FY05 $M) $20.5

Assigned Contingency % 15%

Cost Elements (FY05 $M)

Matls	$7.4
Effort	$6.7
Ohd	$3.3
Conting	$3.1
Total	$20.5

WBS Dictionary Definition: This WBS consists of modifications to the Booster and AGS to prevent RSVP from having an impact on RHIC operations, to allow the Booster and AGS to operate to meet RSVP intensity goals, and modifications that will allow the Booster and AGS to create the beam conditions (bunch structure, frequency, and extinction) as required by RSVP experiments.

Technical Level of Confidence: (choose one)

Prototype Demonstrated		Elements Built & Tested	
Similar System Exists	x	Similar Technology Works	
Novel System Concept		No Candidate Concept Yet	
Other (Comment)			

Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)

Commercial Product	18.8%	Engineered Design	12.0%
Engineered Conceptual	43.3%	Scientist Conceptual	25.9%
Guess	0.0%	Other (specify)	0.0%
		Total	100%

Status of Hardware/Software Development: All Booster and AGS systems have been evaluated based on the impact of high intensity operations on RHIC operations, maintainability of the Booster and AGS for RSVP, and on the basis of achieving the intensity and throughput goals of RSVP. This WBS represents the result of that evaluation as well as those things specified by RSVP in order to perform the experiments.

Issues (funding, collaborator shortage, engineering help, etc.): The only systems which are defined in the WBS but not costed are the Booster and AGS collimators. This is an issue still being discussed within the C-AD AP group and has not developed far enough to allow an engineer to cost out a system.

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Date: 12/29/04 12:00 AM

WBS No. 1.4.1.1

Title: Project Support

Preparer/Manager: Kevin Brown

Current Cost Est.(FY05 $M) $0.3

Assigned Contingency % 16%

Cost Elements (FY05 $M)

Matls	$0.0
Effort	$0.2
Ohd	$0.1
Conting	$0.0
Total	$0.3

WBS Dictionary Definition: This WBS covers the project management of the Booster and AGS modifications. It includes one FTE Liaison engineer management (PE) and 1/2 FTE physicist project management (PPM).

Technical Level of Confidence: (choose one)

Prototype Demonstrated		Elements Built & Tested	
Similar System Exists		Similar Technology Works	
Novel System Concept		No Candidate Concept Yet	
Other (Comment)	Project Management		

Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)

Commercial Product	0%	Engineered Design	0%
Engineered Conceptual	0%	Scientist Conceptual	100%
Guess	0%	Other (specify)	0%
		Total	100%

Status of Hardware/Software Development: This is the costs just for the management. Both the LE and the PPM are also doing engineering and physics under various subsections of the WBS.

Issues (funding, collaborator shortage, engineering help, etc.): This is the projected costs for managing the Booster/ /AGS WBS for the AGS RSVP Project office. These costs are based purely on previous experience and may not properly reflect the demands of the RSVP project. Upper management advice would be useful, given the management complexities of RSVP.

BOOSTER AGS MODIFICATIONS
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Date: 12/29/04 12:00 AM

WBS No. 1.4.1.2

Title: Booster

Preparer/Manager: Kevin Brown

Current Cost Est.(FY05 $M) $4.9

Assigned Contingency % 19%

Cost Elements (FY05 $M)

Matls	$1.6
Effort	$1.8
Ohd	$0.8
Conting	$0.7
Total	$4.9

WBS Dictionary Definition: Booster Modifications for RSVP: modifications to prevent RSVP from having an impact on RHIC operations, modifications to allow Booster to meet RSVP intensity and beam throughput requirements, and modifications to allow the Booster to remain maintainable throughout RSVP operations.

Technical Level of Confidence: (choose one)

Prototype Demonstrated		Elements Built & Tested	
Similar System Exists	x	Similar Technology Works	
Novel System Concept		No Candidate Concept Yet	
Other (Comment)			

Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)

Commercial Product	20%	Engineered Design	19%
Engineered Conceptual	46%	Scientist Conceptual	15%
Guess	0%	Other (specify)	0%
		Total	100%

Status of Hardware/Software Development: This is mostly repairs and improvements to existing designs. Some new designs are involved, such as LINAC to Booster (LTB) transfer line collimators. It includes C3 inflector projection from high intensity protons, collimation in the LTB transfer line, to protect the Booster C5 and C7 main dipole magnets, RF feedback system for the Booster RF to improve beam capture, improvments to instrumentation, other infrastructure improvements to improve maintainability, and shield caps to prevent activated soil from contaminating ground water.

Issues (funding, collaborator shortage, engineering help, etc.): Does not include collimators for the Booster, an issue still being investigated. Also Shield caps are included entirely as a materials cost, since this work is mostly outside contracted.

BOOSTER AGS MODIFICATIONS
RSVP Review Status Sheet

Date: 12/29/04 12:00 AM

WBS No. 1.4.1.3 **Title:** AGS

Preparer/Manager: Kevin Brown **Current Cost Est.(FY05 $M)** $8.7

Assigned Contingency % 19%

Cost Elements (FY05 $M)

Matls	$3.9
Effort	$2.3
Ohd	$1.1
Conting	$1.4
Total	$8.7

WBS Dictionary Definition: AGS Modifications for RSVP: modifications to prevent RSVP from having an impact on RHIC operations, modifications to allow AGS to meet RSVP intensity and beam throughput requirements, and modifications to allow the AGS to remain maintainable throughout RSVP operations.

Technical Level of Confidence: (choose one)

Prototype Demonstrated		Elements Built & Tested	
Similar System Exists	x	Similar Technology Works	
Novel System Concept		No Candidate Concept Yet	
Other (Comment)			

Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)

Commercial Product	20%	Engineered Design	14%
Engineered Conceptual	56%	Scientist Conceptual	10%
Guess	0%	Other (specify)	0%
		Total	100%

Status of Hardware/Software Development: This is mostly repairs and improvements to existing designs. Some new designs are involved, such as a new Electrostatic septum for extraction. It includes new septa magnets for slow extraction, new power supplies for the new magnets, improvments to instrumentation, other infrastructure improvements to improve maintainability, and shield caps to prevent activated soil from contaminating ground water.

Issues (funding, collaborator shortage, engineering help, etc.): Does not include collimators for the AGS, an issue still being investigated. Also Shield caps are included entirely as a materials cost, since this work is mostly oustside contracted.

BOOSTER AGS MODIFICATIONS
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Date: 12/29/04 12:00 AM

WBS No. 1.4.1.4

Title: MECO AGS Mods

Preparer/Manager: Kevin Brown

Current Cost Est.(FY05 $M) $1.4

Assigned Contingency % 22%

Cost Elements (FY05 $M)

Matls	$0.500
Effort	$0.443
Ohd	$0.244
Conting	$0.209
Total	$1.4

WBS Dictionary Definition: AGS Modifications for MECO gap cleaning during bunched beam slow extraction. This includes a new AC dipole system and stripline kickers, which working together clean the gap between the main beam bunches in the AGS. Also included is simulations for MECO extraction.

Technical Level of Confidence: (choose one)

Prototype Demonstrated		Elements Built & Tested	
Similar System Exists	x	Similar Technology Works	
Novel System Concept		No Candidate Concept Yet	
Other (Comment)			

Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)

Commercial Product	15%	Engineered Design	0%
Engineered Conceptual	0%	Scientist Conceptual	85%
Guess	0%	Other (specify)	0%
		Total	100%

Status of Hardware/Software Development: Conceptual Design Only. Some aspects of system tested in accelerator studies.

Issues (funding, collaborator shortage, engineering help, etc.): Cost estimate calls for a new AC dipole magnet. Current thinking is a new magnet is not necessary. Cost estimate also assumes power amplifier for strip-line kickers is designed and built in house. Current thinking is this can be contracted outside.

BOOSTER AGS MODIFICATIONS
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Date: 12/29/04 12:00 AM

WBS No. 1.4.1.5

Title: KOPIO AGS Mods

Preparer/Manager: Kevin Brown

Current Cost Est.(FY05 $M) $5.2

Assigned Contingency % 21%

Cost Elements (FY05 $M)

Matls	$1.4
Effort	$2.1
Ohd	$1.0
Conting	$0.7
Total	$5.2

WBS Dictionary Definition: AGS Modifications for KOPIO. Includes AGS Injection kicker modifications to achieve higher intensity and two new AGS RF cavities that will be used to create the 200 psec micro-bunches for KOPIO.

Technical Level of Confidence: (choose one)

Prototype Demonstrated		Elements Built & Tested	
Similar System Exists	x	Similar Technology Works	
Novel System Concept		No Candidate Concept Yet	
Other (Comment)			

Basis of the Cost Estimate: (by percentage of total cost: sum of fractions = 100%)

Commercial Product	18%	Engineered Design	6%
Engineered Conceptual	34%	Scientist Conceptual	42%
Guess	0%	Other (specify)	0%
		Total	100%

Status of Hardware/Software Development: Conceptual Design Only. Some aspects of system tested in accelerator studies. RHIC 28 MHz RF cavities considered as prototype for 25 MHz RF cavity.

Issues (funding, collaborator shortage, engineering help, etc.): Cost estimate calls for a 100 MHz RF Cavity. Whether or not this is needed will not be known until the 25 MHz RF cavity is built and tested with beam. Cost estimates assume majority of Kicker and 25 MHz cavity costs are covered by the Canadian Foundation for Innovation and managed by TRIUMF.