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*Economic Policy Reform and
Competitiveness Project*

Estimated International Recognized Cashmere Testing Laboratory

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ABBREVIATIONS AND ACRONYMS

AATCC	American Association of Textile Chemists and Colorists
ADB	Asian Development Bank
AS	Standards of Australia
ASTM	American Society for Testing and Materials
BS	British Standards (Institution)
BS/DIN/NF	British Standards Institution /Deutsches Institute Für Normung / Association
EN	Francaise de Normalisation EN means they're equal
CAN/CGSB	Canadian General Standards Board
CCMI	Cashmere and Camel Hair Manufacturers Institute
CFR PART	USA Code of Federal Registrar Part Number
CI	Color Index
DTM	Draft Test Method
EC	European Communities
FIFTA	Foreign Investment and Foreign Trade Agency
GB/T	Code of Chinese Standard issued by Standardization Administration of China
GTZ	German technical cooperation
ISO/FDIS	International Organization for Standardization/Final Draft Standard
IWTO	International Wool Textile Organization
JEOL	Japan Electron Optics Laboratory CO.,LTD
JIS L	Japanese Standards Association
MFS	Mongolian Fibermark Society
NGO	Non-government Organization
OFDA	Optical Fiber Diameter Analyzer
RMB	Chinese currency renminbi
SEM	Scanning Electronic Microscope
TWC	The Woolmark Company
VAT	Value added tax
USAID	United States Agency for International Development
US CPSC	The US Consumer Product Safety Commission

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EXECUTIVE SUMMARY

The objective of this study is to produce an analysis report that will reveal the current cashmere testing situation in Mongolia. The report will also provide a list of appropriate cashmere testing equipment, with cost, in order to set up an internationally recognized cashmere testing laboratory. At the same time, this cashmere laboratory should generate sufficient income to be self sustained. The cashmere testing laboratory should be an independent testing laboratory. The laboratory can be fully owned by independent organization or joint ventured with financial institute such as ADB. This cashmere testing laboratory should have close working relationship with the cashmere industry as well as the Mongolian Fibermark Society (MFS). But most important of all, this cashmere testing laboratory must be internationally recognized and has close connection with the western retailers and government agencies. There are no sufficient data available to substantiate how much testing income will be secured by this cashmere testing laboratory. We are recommending to operate this cashmere testing laboratory in four separate stages.

International promotion and marketing activities to promote Mongolian cashmere industry with world renown independent testing laboratory will ensure return of investment with this cashmere testing laboratory. Most Mongolian manufacturers are limited in branding and promotion. Education and training are key to the success of this cashmere testing laboratory. If the cashmere testing laboratory is properly managed, we believe this testing facility will be able to payback its investment in 2 to 3 years.

SECTION I: CASHMERE TESTING LABORATORY SET UP – FIELD TRIP STUDY IN ULAANBAATAR

Ms. Jihong Chen, Laboratory Director of Intertek Testing Services Beijing, China and Mr. Francis Yuk, Vice President, International Business of Intertek Testing Services USA visited Ulaanbaatar, Mongolia from September 17 through 21, 2007. Ms. Chen is the world recognized and reputable cashmere analysis specialist. Francis has extensive knowledge in cashmere manufacturing and international trade practice. He also has over 20 years working experience with upscale retailers in the western countries. Jihong and Francis visited following companies during their stay in Mongolia.

- 1. Chemonics, Ulaanbaatar** [September 17]
Understanding of the basic cashmere industry in Mongolia.
- 2. Textile Institute, Mongolia University of Science & Technology** [September 17]
Visit cashmere testing facility and process at University level.
- 3. Mongolia Ministry of Industry and Trade** [September 17]
Understanding of Mongolia manufacturing and export industry, importance of product quality and government support to set up internationally recognized cashmere testing laboratory.
- 4. Gobi Corporation** [September 18]
Visit the largest cashmere manufacturing plant in Mongolia, yarn production, dyeing and finishing, knitting, garment production as well as in-house quality control laboratory.
- 5. Goyo Co. Ltd** [September 18]
Visit the 2nd largest cashmere manufacturing plant in Mongolia. Export both dehaired cashmere and finished cashmere garment to western countries. Understand their need for independent and reputable cashmere testing laboratory.
- 6. The State Specialized Inspection Agency** [September 18]
Learn about wide scope of responsibility with this agency and their wish to develop world class testing lab dated back to 2004. Was informed of mercury spill in one of Mongolian gold mines. Contacting Intertek Testing in Hong Kong for testing assistance.
- 7. Altai Cashmere Co. Ltd** [September 19]
A small size cashmere knitwear factory, subcontract cashmere spinning to China. Building cashmere business upon fashion and complicated design.
- 8. Actlabs Asia Llc.** [September 19]
Laboratory works on 3 shifts a day. Fire assay analysis (gold) 1,500 test submission a day. Strong customer relationship through their Canadian headquarters.
- 9. Mongolia Foreign Investment And Foreign Trade Agency (FIFTA)** [September 19]
All imported testing equipment need to file import duty plus VAT. Import chemicals need to file separately with appropriate government agency with great details.
- 10. Mercy Corps** [September 19]
NGO working with herders throughout 11 provinces re super fine cashmere project. Raw and dehaired cashmere samples were sent to different lab, i.e. one to RIAH in Ulaanbaatar. Test result shows there are great discrepancies between the 2 labs.
- 11. Mongolia Customs General Administration** [September 20]
Mongolia Customs welcome an internationally recognized testing lab to be established in Ulaanbaatar. Their current duty in handling cashmere export and import are mainly

for security reason. At this moment, Mongolian Customs has no specific testing facility to handle cashmere fiber content analysis.

12. Mongolian Ministry of Finance [September 20]

Suggest to contact Dept of Financial Assistance to gather more info re laboratory set up and company profit tax subject.

13. USAID Program Meeting [September 20]

Participated at one of USAID regular meetings. Explain to the key managers re our findings.

14. SES [September 21]

NGO from Germany, providing management and marketing support to consumer product manufacturing industry in Mongolia. Work closely with GTZ, another NGO with stake holders including Germany government agency. Need for carpet testing service.

15. Eermel Company [September 21]

This is one of the few cashmere factories with weaving facilities. Since quality has been implemented into the factory, they turnaround and export quality sweater and woven cashmere to EU and USA.

16. Asian Development Bank: ADB [September 21]

ADB is sponsoring “Branding Mongolia” program. Cashmere industry is one the industry they are working.

17. Mongolian Fibermark Society; MFS [September 21]

Attend MFS membership meeting. This will be one of the key sources of cashmere quality upgrading force.

SECTION II: MARKET EVALUATION AND POTENTIAL TESTING INCOME FOR PROPOSED CASHMERE TESTING LABORATORY

Four categories of cashmere manufacturers and cashmere related vendors will be the core customer involved in this cashmere testing laboratory.

- a) Cashmere Manufacturers: Dehaired Cashmere, Yarn and Finished Garment
Estimated annual testing volume (submission of test samples): 500 samples, with a high estimation of 1,500.
- b) Mongolia Fibermark Society (MFS): Manufacturers, Exporters, Buyers,
Estimated annual testing volume: 1,000 samples, with a high estimation of 3,000.
- c) Herders (Gobi Initiative):
Estimated annual testing volume: 600 samples, with a high estimation of 3,000.
- d) Mongolian State Specialized Inspection & Customs Agency:
Estimated annual testing volume: 60 samples, with a high estimation of 180 samples.
- e) Other submission: non cashmere textile items, i.e. Wool, Camel Hair textiles.
Estimated annual testing volume: 200 samples, with a high estimation of 600 samples.

Annual Estimation of cashmere and non cashmere submission: 2,360 samples, with a high estimation of 8,280 samples.

SECTION III: ESTIMATED CASHMERE TESTING SERVICE FEE INCOME PER ANNUM:

In comparing with cashmere testing services in Europe and North Americas, US\$400 to \$700 per sample is the norm, depends on testing items, annual testing business volume and price negotiation between testing laboratory and the applicant. While in the Far East, including Hong Kong and China, cashmere testing fee is around US\$50 to \$60 a sample. Therefore, for Mongolia, we are proposing testing fee of US\$50 per sample for cashmere fiber identification.

For complete package of testing, including color fastness, pilling, tensile strength, care labeling evaluation, we would propose testing fee of around US\$150 per sample.

Assuming average testing fee for cashmere is around RMB600 per sample, estimated annual income for this new cashmere testing laboratory would be approximately. $2,300 \text{ sample} \times \text{RMB}600 = \text{RMB}1,380,000$ (or US\$170,000) per year.

SECTION IV: START UP OF CASHMERE TESTING LABORATORY

The cashmere testing laboratory should perform all necessary testing for all textiles, i.e. raw cashmere, semi processed and finished products, including but not limited to cashmere, camel hair, yak hair and sheep wool, for both knitted and woven textiles. Testing done at this laboratory should be performed in accordance with international standards, such as ISO, IWTO, or buyer's standards for shipments destined to western countries such as Canada, USA, Germany, Italy, France, Spain, UK, as well as Far East countries like Japan, Australia and Korea, etc.

In order to meet with western cashmere retailers' need, 4 separate stages of testing are recommended, with Stage 1 focus on **company registration and cashmere samples collection in Mongolia and testing with reputable cashmere lab in neighboring country** before the key players and herders cool down their enthusiasm in cashmere quality testing and upgrading. Stage 2 to Stage 4 are involved in laboratory equipment investment, installation and technicians training.

Therefore, three (3) corresponding testing laboratories will be set up at 3 different stages, namely,

Cashmere Testing Laboratory
Physical Property & Color Fastness Lab
¹ **Eco-test Lab**

¹ Please note the investment cost of setting up an eco textile testing laboratory is very high, i.e. approximately RMB6 million (US\$750K). Unless there is sufficient eco testing business, an eco-test laboratory will be operated in red. Thus the other preferable option is to subcontract eco-test testing with a neighboring testing laboratory.

SECTION V: PROPOSED FOUR STAGES OF SETTING UP FULL SCALE CASHMERE TESTING LABORATORY IN ULAANBAATAR

Stage 1:

To register cashmere testing laboratory with appropriate Mongolian government agencies in Ulaanbaatar. Start up cashmere testing with manufacturers, who exports cashmere products, to Asian and western countries. Stage 1 is recommended, in order to assist and expedite quality cashmere shipments to off shore buyers. So to improve and maintain the reputation of Mongolian cashmere. Cashmere samples collected can be sent via air courier to neighboring reputable cashmere laboratory in China.

Stage 2:

To set up testing laboratory for dehaired cashmere and other specialty animal fibers and sheep wool.

Following Testing Items should be include:

- ·Fiber identification and fiber content test
- ·Fiber diameter(projection/OFDA)
- ·Fiber length (by hand/comb/Almeter)
- ·Single fiber strength
- ·Moisture Content
- ·Coarse fiber content
- ·Foreign matter content
- ·Grease content

Stage 3:

Stage 3 Testing Laboratory should be able to handle following textile testing items

- ·Fiber content
- ·Color fastness (light/crocking/water/perspiration/washing/dry cleaning etc.)
- ·Dimensional stability (after washing/dry cleaning)
- ·Strength (tensile/bursting/seam properties/seam bursting strength)
- ·Yarn count/twist
- ·Fabric weight/Threads per unit Length
- ·Pilling resistance (pilling box/Martindale/Random)
- ·Abrasion resistance
- ·Flammability

Stage 4:

The world is searching for environmental friendly products, Eco-textiles have been in needed by European countries, mainly Germany and Sweden. Environmental friendly is a trendy product. To achieve such goal, following items should be tested:

- ·pH value
- ·Formaldehyde
- ·Extractable heavy-metals(Sb/As/Pb/Cd/Cr/Cr(_)/Co/Cu/Ni/Hg)
- ·Pesticides
- ·Chlorinated phenols(PCP/TeCP)
- ·Phthalates(DINP, DNOP, DEHP, DIDP, BBP, DBP/DEHP, BBP, DBP)
- ·Organic tin compounds(TBT/DBT)
- ·Other chemical residues(opp/arylamines)

- ·Colorants(cleavable arylamines/carcinogens/allergens/others)
- ·Chlorinated benzenes and toluenes
- ·Biological active products
- ·Flame retardant products(PBB/TRIS/TEPA/pentaBDE/octaBDE)
- ·color fastness (staining)
- ·Emission of volatiles
- ·Determination of odors

SECTION VI: PROPOSED LIST OF TEXTILE TESTING EQUIPMENT AND INVESTMENT COST

Cashmere Testing Laboratory

	Apparatus	Type	Manufacturer or Brand	Price (RMB)	Standard
1	Light Microscope Projection	CYG-055C	Shanghai, China	13,400	Fiber identification and fiber content test (LM method)
2	WIVnt Fiber Analysis and Measurement System	PS-	Beijing, China	41000 【exception of Personal computer (incl. monitor and printer)】	AATCC 20/20A ISO/FDIS 17751.2 GB/T 16988 Fiber diameter ASTM D 2130 ISO 137 IWTO 8 GB/T 10685
3	Fiber Cutter	Y(B)172	Changzhou, China	450	
4	Wedge scale (Standard)		China Fibre Inspection Bureau	430/1000 pieces	
5	OFDA Diameter Tester	OFDA 4000	Hornik Fibertech	800,000	Fiber diameter IWTO 47
6	SEM	JSM-6390	JEOL	1,000,000	Fiber identification and fiber content test (SEM method) IWTO 58
7	Comb Sorter		China	3,000	Fiber Length IWTO DTM-1
8	Almeter Fiber Length Tester	Almeter 100	Switzerland	600,000	Fiber Length IWTO 17
9	Board Covered With Black Velveteen, Ruler Which Can Be in Shape Changing			100	Fiber Length GB 18267
10	Electronic Single Fiber Strength Tester		Nan Tong, China	28,000	Single Fiber Strength GB/T 4711
11	Oven With 8 Baskets		China	5,500	Moisture Content GB/T 6500
12	Electronic Balance	AW220 0.0001mg	SHIMADZU	12,000	Coarse fiber/ Foreign matter content GB 18267
13	Oven		HUABEI	2900	Grease content BS 3582 TWC TM136 ASTM D 1574 IWTO 10 GB/T 6977
14	Soxhlet Extractor (4 sets)			1200	
15	Water Bath	TW 20	Julabo	13,500	

Total Equipment Cost: Approximately. RMB2.50 million (USD340K)

Physical Property & Color Fastness Testing Laboratory

	Apparatus	Type	Manufacture or Brand	Price (RMB)	Standard
1	Electronic Balance	AW220 0.0001g	SHIMADZU	12,000	Fiber content (chemical method) AATCC 20/20A BS 4407
2	Constant temperature bath		BINDER	92,400	ISO 1833 /5088 JIS L 1030 GB/T 2910/2911
3	Shaker		Barnstead Lab-Line	1,050	CAN/CGSB-4.2 No.13 /14 NF G06 006-035 AS 2001.7
4	Vacuum pump			1,400	
5	Xenotest Alpha HE	55007804	Atlas	562,500	ISO 105 B02 GB/T 8427 BS/DIN/NF EN ISO 105 B02 CAN/CGSB-4.2 No.18.3
6	CI4000 Weather-Ometer	CI4000	SDL Atlas	992,200	AATCC 16E JIS L 0843 (Xenon arc lamp)
7	Cool water chiller	PA403R	PAN ASIA	30,000	
8	Crockmeter	CM-1	Atlas	8,415	ISO 105 X12 GB/T 3920 BS/DIN/NF EN ISO 105 X12 AATCC 8 AATCC 116 JIS L 0849 TYPE 1 CAN/CGSB-4.2 No.22
9	Perspiration Tester	PR-1	SDL Atlas	5,910	Water : ISO 105 E01 GB/T 5713 BS/DIN/NF EN AATCC 107 JIS L 0846 CAN/CGSB-4.2 No.20 AS
10	Standard Multi-fiber fabric				2001.4.E01 Perspiration: ISO 105 E04 GB/T3922 AATCC 15 JIS L 0848 BS/DIN/NF EN AS 2001.4.17 CAN/CGSB-4.2 No.23
11	Lanunder-Ometer	LEF	Atlas	262,000	Washing: ISO 105 C06/C10 GB/T 3921/12490 BS/DIN/NF EN AATCC 61 AS 2001.4.15 JIS L 0844 CAN/CGSB-4.2 No19.1 Drycleaning: ISO 105 D01 GB/T 5711 BS/DIN/NF EN ISO 105 D01 AATCC 132 AS 2001.4.16 JIS L 0860 CAN/CGSB-4.2 No29.1
12	Gyrowash		ROACHES	110,00	
13	Standard soap/detergent, standard multi-fiber cloth, standard single-fiber cloth,				
14	Assessment Cabinet		VeriVide Limited	21,000	Assessment for all color fastness tests
15	Grey scale (for USA)		AATCC	1,550	
16	Grey scale (for EU)		SDC	1,250	
17	Kenmore Automatic	Kenmore 22862	SEARS Roebuck	13,500	AATCC 135/150 CAN/CGSB-4.2 No.58

	Washer		and Co.		
18	Wascator	FOM 71 CLS	Electrolux	140,000	ISO 5077/6330 GB/T 8629/8630 BS/DIN/NF EN ISO 25077/6330 AS 2001.5.4
19	Dryclean machine		safQ	30,000	Commercial drycleaning
20	Tumble Dryer	M223/2	SDL Atlas	21,200	ISO 5077/6330 GB/T 8629/8630 BS/DIN/NF EN ISO 25077/6330 AS 2001.5.4
21	Standard soap/detergent, ruler,				
22	Truburst Strength Tester	600	JAMES H.HEAL	111,000	ISO 13938-2 BS/DIN/NF EN ISO 13938-2
23	Mullen Bursting Tester	Model C	Mullen	99,750	ISO 13938-1 GB/T 7742 JIS L 1018 BS/DIN/NF EN ISO 13938-1 ASTM D 3786 AS 2001.2.4 CAN/CGSB-4.2 No11.1
24	Tensile Testing Machine	H10KS	Hounsfield	328,500	Tensile : ISO 13934-1/2 GB/T 3923.1/2 ASTM D 5034/5035 BS/DIN/NF EN ISO 13934-1/2 JIS L 1096 CAN/CGSB-4.2 No9.1/2 AS 2001.2.3.1/2 Seam : ISO 13935/6 JIS L 1093/1096 GB/T 13772.1/13773 BS 3320 AS 2001.2.20/21/22 NF G 07 117 BS/DIN/NF EN ISO 13935/6
					ASTM D 1683 /434 CAN/CGSB-4.2 No 32.1 Tearing : ISO 13937-2/3/4 GB/T 3917.2/3 ASTM D 2261 BS/DIN/NF EN ISO 13937-2/3/4 JIS L 1096 CAN/CGSB-4.2 No12.1/2 AS 2001.2.10 ASTM D 5587
25	Elmendorf	60-2001	Thwing- Albert	70,000	ISO 13937-1 GB/T 3917.2 JIS L 1096 BS/DIN/NF EN ISO 13937-1 ASTM D 1424 AS 2001.2.8 CAN/CGSB-4.2 No.12.3
26	Bundle of Yarn Meter	Y219B	SDL Atlas	23,000	BS EN ISO 2060 ASTM D1907
27	Electronic balance			1000	
28	Electrial Twist Tester	Y220B	SDL Atlas	55,425	ASTM D 1422/1423 ISO 2061 JIS L 1095 GB/T 2543.1 CAN/CGSB-4.2 No.8 AS 2001.2.14 BS/DIN/NF EN ISO 2061
29	ICI Pilling Box	516	JAMES H.HEAL	69.990	ISO 12945-1 GB/T 4802.3 BS/DIN/NF EN ISO 12945-1 JIS L 1076 AS 2001.2.10 CAN/CGSB-4.2 No51.1

30	Martindale	864	JAMES H.HEAL	189,800	Pilling: ISO 12945-2 GB/T 4802.2 BS/DIN/NF EN ISO 12945-2 Abrasion: ISO 12947 JIS L 1096 BS/DIN/NF EN ISO 12947 AS 2001.2.25 ASTM D 4966
31	Random Tumbler Pilling Tester	PT-2	Atlas	37,500	ASTM D 3512 JIS L 1076 CAN/CGSB-4.2 No51.2 NF G 07 121
32	Pilling Viewer		VeriVide Limited	82,000	ISO 12945-1 GB/T 4802.3 JIS L 1076 BS/DIN/NF EN ISO 12945-1 AS 2001.2.10 CAN/CGSB-4.2 No51.1
33	45DEG. Flammability Tester	TC-45	The Govmark Organization Inc	69,800	US CPSC 16 CFR PART 1610
34	safQ Button Strength Tester	STA-S1		20,000	
35	Roaches Zip Tester			330,000	
36	Sewing machine	Plain stitch sewing	JUKI Co.	2,600	
37	Whipstitch	MO6700	JUKI Co.	5,900	

Total Equipment Cost: Approximately RMB1.7 million (USD220K)

Eco-test Laboratory

	Apparatus	Type	Manufacture or Brand	Price (RMB)	Standard or Test item
1	pH meter	320	METTLER TOLEDO	2,300	AATCC 81 ISO 3071 GB/T 7573 BS/DIN/NF EN ISO 1413
2	Shaker machine	SW22	Julabo	32,880	
3	ICP-AES			1,000,000	Total heavy metal(Including total lead, total cadimium) EN71-3(acid exactable heavy metal)
4	Spectrophoto meter UV-VIS	CARY 100		150,000	Cr(VI) Formaldehyde
5	GC/MS			800,000	PBBs & PBDEs PCP Phthalates PAHs AZO Organotin
6	GC/MS with headspace sorptive extraction system			1,000,000	VOC
7	HPLC/DAD	1100	Agilent	800,000	PBBs, PBDEs, AZO Formaldehyde
8	AFS			250,000	Oeke-Tex 100/200
9	LC/MS			1,500,000	Carcogenic dyes Allergenic dyes PFOS
10	FTIR			300,000	PVC Asbestos

Total Equipment Cost: Approximately RMB5.84 million (USD780K)

SECTION VII: TECHNICAL QUALIFICATION OF LABORATORY TEAM

1. Cashmere Laboratory Technical Manager

Cashmere laboratory: candidate should be graduated from textile college and worked either with cashmere industry, laboratory or manufacturer.

2. Physical Property & Color Fastness Laboratory Technical Manager: graduated from textile college.

3. Eco Test Laboratory Technical Manager: graduated from University, with major in chemistry.

All Laboratory Technical Manager should understand principle of all tests and familiar with all testing standards at relevant laboratory. Job responsibility includes, but not limit to:

=> Respond to client about technical questions related those questions testing labs.

=> Explain and evaluate test result.

Laboratory Technician:

Graduate from technical college. All technicians should have been trained with textile laboratory for a minimum of 3 months.

For cashmere laboratory technician, the candidate should have been trained by CCMI accredited manager for at least 12 months.

Customer Service Coordinator:

Graduated from Textile College. Should have been properly trained with experienced manager.

Optimum Staffing Requirement

General Manager: 1

² Laboratory Technical Manager: 3

Coordinator: 2

Technician: 10 -> 4 for cashmere, 4 for textile and 2 for Eco-test laboratory

Laboratory Testing Equipment Maintenance: 1

QA: 1

Other Details Affecting the Feasibility and Cost

1. Laboratory Location: Prefer to be on the ground floor.
2. Total area should be no less than 300 square meter. 80-100 square meter should be separated into 2 conditioning rooms, 1 for cashmere and the other for textile laboratory.
3. 2 sets of Air Conditioners would cost RMB360K (US\$48K).
4. 2 office rooms and 1 meeting room, total at least 60 square meter.
5. Cost of conditioner and testing equipment does not including 15% import duty to Mongolia. There should be additional installation fee for air conditioner.
6. At appropriate time, the laboratory should be certificated according to ISO 17025 by international accredited body.
7. Depends on actual situation, there will be training cost for training laboratory technicians.

^{2*} Depends on business nature and actual business volume, only 1 technical laboratory manager could be sufficient for running the testing lab.