	NCSX Work Approv	val Form	(WAF)	
	umber: 145		<u> </u>	
	tle: Modular Coil-Coil Inten mber: 1431	naces		
		Janwaro		
	e: Modular Coil Interface I nager: Larry Dudek	Tai wai t		
Description:	:			
	Procure necessary parts and consumables Coils interfaces. This job only covers M&S consumables is covered under WBS 82 (w	support - labor	r to procure the parts and	dular
Schedule:				
Approvals:				
	Job Manager	_	Date	
	Responsible Line Manager		Date	
	Project Manager		Date	
	Engineering Department Head	_	Date	

## NCSX June 2007 ETC TABLE I - DESIGN LABOR

	1 1			1				1	1	1	1	1	1	
WBS Number: 145														
WBS Title: Modular Coil-Coil In	terfaces													
Job Number: 1431														
Job Title: Modular Coil Interfac	e Harware	•												
Job Manager: Larry Dudek														
	· · ·	,			· · · ·				,				,	
Description:														
No Design Work Associated with This Job.			 			 	 							
									1					

### NCSX June 2007 ETC TABLE II - Materials and Subcontracts

TASK DESCRIPTION				Estimate		1				4		Basis of Estima	ate
	41MS (\$)	48MS (\$)	STK (\$)	EMEM	EMSM	EMTB		EASB (Hrs)					
]				(Hrs)	(Hrs)	(Hrs)	(Hrs)	l					
						1	1	1				1	
Shim Blocks	104,956								100 5				
Total SS material Required: 24 in sq x 800 pcs + 50 sq ft for nose									162.5	sq ft	Includes allowance for		
Raw Material @ \$8 / # (per verbal Ludlum steel quote)	60,556								60	sq ft (nose shims)	Basis Of Estimate: V	erbal Price quote from Lu	idlum Steel (see Table V)
									7569.45	# 310SS			
Qty of 2' x 2' shts=162/4									56	plates (2' x 2')			
Drum Finish \$50/side (both sides)	5,600										Basis of Estimate: Pa		
Waterjet cutting @ 8 Hr/sheet						448					Basis of Estimate: Re		
Alumina Application per quote from A&A Coating = (both Sides)	38,800										Basis of Estimate: Qu	ote from A&A Coatings (	see Table V)
Inboard Weld Joint													
Weld wire for inboard joint (12 cu. In /joint * 15 joints * .3 #/cu. In.)+ 10% v	vas 2,400					1	1				Basis of Estimate: Que	te from MetalTEk (actual C	Cost) see Table V
	-												+
G-11 Bushing Estimate		l	1			I	·	1	166	\$ / 4 ft. length (based on reco	ent price for round stor	0	+
Price \$0.45/cu. In Quantity Required	_								813	Pcs	See Table V for Back		
2" dia. Convolution Roll G-11CR	8,050								1626	linear Inches	See Table V for Back		
PPPL Machining Labor						554			135.5	Ft	See Table V for Back		Updated to reflect prefabricated h
Stud Kits	389,885		1 1	1		554			33.875	4' Lengths	See Table V for Back		Opdated to reflect pretabilitated i
10.5 Studs	48.375									(\$268.75 ) x 3 FPA => See Table		1p	Updated Est.
7.5 studs	95,088									x \$226.40 ) x 3 FPA => See Table			Updated Est.
Washers	116,220									ical sets x \$149 x 3 FPA => See			Opuated Est.
Sphercial Sets	127,140									ers x \$163 x 3 FPA => See Table			
Nuts	3,062									nuts needed with 20% wastage => see		do V	
Bladders Estimate	3,002		1 1				1		Assume 110	nuts needed with 20 % wastage => see	wicwaster Carr quote in Tai	iic v	
Quantity Required= 50	9,050								See Ameri	ican Flouroseal Quote (Table V)			
Engineering Charge	3,800									ican Flouroseal Quote (Table V)			
Price per piece \$180	5,000								Jee Ameri	icali i loui oseal Quote (Table V)			
Supernuts	123,750		1 1	1		1	1		See Super	bolt Quote (Table V)	(Povisod 6/6/07 to	add 50 Supernuts fo	r Line 27 below)
Supernuts	125,750								Jee Juper			add 50 Supernuts 10	Line 27 below)
Stud Kits for C-C Joints, and Weld Clamping													
10.5 Studs	13,438								50 Studs x	\$268.75			
Washers	16,300								100 Wash				
Sphercial Sets	14,900								100 Wash				
Nuts	14,900	L								ost per McMaster Carr Quote in	Table V		1
Nuis	1,100								<u></u>	St per memaster carr whole in			1
Sliding Shims for C-C inboard leg													
G-11 Shims	1,440								480 cubic	inches/joint x 3 joints x \$1 per o	III Inc See Onote table V		1
Machining Labor	1,440					48				6 hours per piece x 3 pieces		gineering Judgement detail	ed design does not exist
Misc Tech Shop Support @ 1/2 mm/mo. Through FPA sta 2 12 mo.			1 I			960				ng estimates based on recent ex		sincering subgement details	a design does not exist
mise reen enop eupport e nz minerito. Thiough PA sta z 12 mo.						300			Lighteen	ing commutes based on recent es			
TOTAL	689,069					2010							
	000,000												
ble V has the detailed backup, including actual quotes	689.0685												+
			1			1							

# NCSX June 2007 ETC TABLE III - Fabrication/Assembly Installation

WBS Number: 145								
WBS Title: Modular	Coil-Coi	I Interfaces						
Job Number: 1431								
Job Title: Modular C	oil Inter	face Harware						
Job Manager: Larry	Dudek							
				1	1	1	1	1
In-house Fabrication ar	nd Assen	bly and Installation						
Description: N/A								

## NCSX June 2007 ETC TABLE IV - Uncertainty of Estimate and Residual Risk Assessment

WBS Number: 145 WBS Title: Modular Coil-Coil Interfaces Job Number: 1431 Job Title: Modular Coil Interface Harware Job Manager: Larry Dudek

#### **Uncertainty of the Estimate**

î				Uncertainty	
	High	Medium	Low	Range (%)	Comments/Other Cionsiderations
Design Maturity		х			Design still evolving - no drawings of shims, bushings (even material choice uncertain) => only studs pretty well finalized.
				-15%/+25%	
Design Comlexity		Х			Complexity rated as medium since criteria for loads is demanding.

#### Note: High/Medium/Low uncertainty assessment from Job Manager. Uncertainty range based on AACEI recommended practice 18R-97 as amended for NCSX.

Residual Impacts					Cost	mpact	Schedule	Impact	
Job	Risk Description	Likelihood of Occurring	Mitigation Plan	Basis of estimate	Low	High	Low	High	
NONE									

Notes:

- [1] Low cost and schedule impacts are considered the minimum (0-percentile) impacts should the event occur. High cost and schedule impacts are considered the maximum (100-percentile) impacts should the event occur
- [2] Cost impacts should be entered as man-hours (by demographic) and M&S direct cost under basis of estimate. Cost impacts should NOT include standing army costs which are separately calculated from the schedule impact Project control is reponsible for quantifying the low and high cost impacts based on the labor hours and M&S identified
- [3] The schedule impacts should be entered as the min and max impacts on the critical path.
- If there is no critical path impact then the schedule entries should be zero.
- [4] Likelihood of occurrence should be entered consistent with our risk classification methodology, i.e.
   VL= Very Likely (P>80%), L=Likely (80%>P>40%), U=Unlikley (40%>P>10%), VU=Very Unlikely (P<10%), NC=Non-credible (P<1%)</li>

entires Management for

Ma+9.2007

87206

Unit Prior

\$40.50 EACH

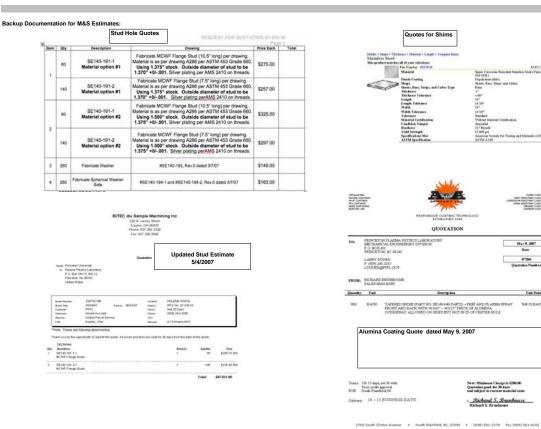
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Richard S. Busheuse

314/3146L) Unpole dont (Mill) Blancis, Bara, Bittips, and Cal Plain

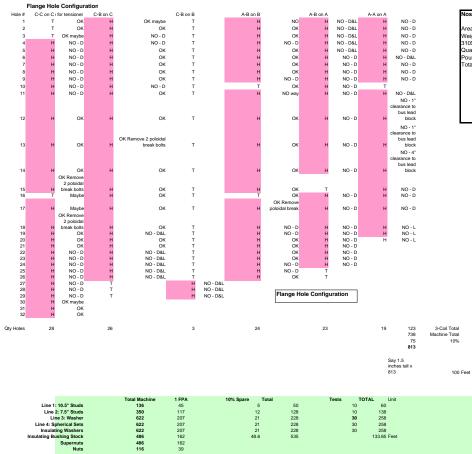
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WBS Number: 145 WBS Title: Modular Coil-Coil Interfaces Job Number: 1431 Job Title: Modular Coil Interface Harware Job Manager: Larry Dudek



n- Muthit, Lany BITEC de Sample Mantening Inc.

WBS Number: 145 WBS Title: Modular Coil-Coil Interfaces Job Number: 1431 Job Title: Modular Coil Interface Harware Job Manager: Larry Dudek



	A to A Join A	to B-E	A to B-D	B to C-E	B to C-E	C to C-D	Comments	
Area (sq. Ir	345.5	521	535	203	223	426	Scaled off of template draw	ings SE
Weight (lbs	64.8	97.7	100.3	38.1	41.8	79.9		
310SS=0.3	#/cu.in.							
Quantity	3	3	3	3	3	3		
Pounds	194.3	293.1	300.9	114.2	125.4	239.6	1267.59	
Fotal Area	1,036.5	1,563.0	1,605.0	609.0	669.0	1,278.0	6760.50 Sq. In.	46.9 Sq. Fee
							253.52 25% Extra for Wastage	
							633.80 50% Extra for Various Thick	nesses
							8915.41	
							71300.00 Cost @ \$8/#	

33.4125

WBS Number: 145 WBS Title: Modular Coil-Coil Interfaces Job Number: 1431 Job Title: Modular Coil Interface Harware Job Manager: Larry Dudek

ed. BUIRATERS' BUIS PM		
	FIGH 1 (MERICIN PLOYODEL FIGH 10, 1 201-990-1472 Here 10 2007 (2114HH PL	
Princeton Plasma Physics Laboratory Procurement Card System	American Photosocial Corporation QUOTATION	
Matte Return to Reconciliation Approval Net ID : dudek	Classing and Arms. Control of the Co	Nuts This product matches all of your selections.
	W The science of the	The state of the s
P-Card Log # : 1H-114278 12 R G11-(CR) 2.0 ID × 2.25 0D Tube	charge is higher than originally estimated. This	Nut Type Machine Screw and Hen Mats
Regiertor: Michael E Visia Status Reconciled Cardholder Inneighan Created, 1/12/2007	is because the bag we ended up with is actually	Machine Screw and Hex Nut Hex Type
P-Card Log Line Stem	QUOTATION # 1297 larger, so they needed to build some fixturing.	Material Type Stanley Steel
Une Denne Sanatara Adharita Ober, Sanamentata Kasima Attadpanta Denne Delivers/Bestemachts		Grade/Class Not Rated
		Stainless Steel Type 316 Stainless Steel System of Measurem ent Inch
Une Quantity 00H Unit Price Extended Receipt Date Receipt Comment.	Ta: FOM Division Quotation No. 1297	Inch Thread Size 1-3/0*-6
Enter Complete Description - Induke make, model, items specifications, etc.	Prior men Planna Physics Lab P.O. Ben 455 Requested by Lawrence Dudek	Thread Direction Right-Hand Thread Width 2-3/16*
12 ft 611-(0k) Cryogenic epocy based lamites tube 2.0 ID × 2.0505 × 48" lung	Princeton, New Jersey Question Vallet N days	Height 1-11/32"
net Center Distribution Accounts for this Line Item	F.O.B. Gubberderg, MD USA Turans Net 34	Thread Type Standard Threads Rockwell Hardness B60
Cost Ctr Wrik Plug 3xb Plug Expense Clear Dollar Dollar Dollar Amount	Tel: 609 243 2185	Specifications Met American National Standards
HER 1*** 1421 (101 44700 45.6 100/01 2) \$207.47	Tear 609 243 3246	Isimitate (AMSI) and American Society of Mechanical Engineers
And the Annual Annua		(A:SME) ANSI Specification A3/SLB18.2.2
Add 0 Lone Items Add 8 Gost Centers (Add Lines)	1 Regissering mi up fm, unn refundade fmg # 2011-7979, \$3,804.00     5,3404.00     5,141.00     5,141.00     5,141.00     5,141.00	ASSI Specification ASSI B18.2.2 ASSIE Specification ASSIE B18.2.2
Ander Kaniel Date Ordered Date Superfect	). REP. Wag Support Matthe	
Pranklin Pher-Lawrence Corp 302-6523623 2/22/2007 2/22/2007		
hydrated Amount \$0.00 Dioping/Manding: 0.11		
Other Charges Comment:	SHIPPING	
G-11 Backup	TOTAL	
Total Osegee: 10.00	COMMENTS	
The staget	<ol> <li>charges discontance require new drawing approval, additional engineering from.</li> <li>dothery time after approval of drawing and perchane order: 39 monking days.</li> </ol>	
Subject for Approval ( Copy Log ) ( Deverting )	<ol> <li>Style of englaneting from date with order.</li> <li>Payarent: not 30 - a SVC CHG of 2% per 3de fequal to 24% per 3rt will be edded to post that have invo.</li> </ol>	
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	Hinto Calls May 6, 2003	
International generation of the state of the	Hind Calls May 9, 2007	
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Superbolt Quote		
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Superbolt Quote Free Text Text Text Text Text Text Text Te	mean nut body in Niberse 50, and Jusidoste & washer in inconst (*)8. Here of the sample Tragamot I want 81* Regards. Stree Brandparch.	
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Superbolt Quote           Press         Wein Russiane           Russiane         Russiane	main nut Body in Nitrons 10, and Justicolis & washer in Inconel 718. How did the warning Torgunant I wet 81° Regards. Serve Buschstord, provide State State State State State State State State State State State State State State State State State State State State State State	
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WBS Number: 145 WBS Title: Modular Coil-Coil Interfaces Job Number: 1431 Job Title: Modular Coil Interface Harware Job Manager: Larry Dudek

From: Larry Dudek Subject: Price and Delivery Date: May 15, 2007 1:58: To: FRED DAHLGREN Cc: Wayne T. Reiersen ▶ ♂ 2 Attachments, 852	53 PM EDT	4	From: Phil Heitzenroeder Show in Mailtx Subject: RE: Weld Material December 15,0002 0.02.24 PM EST To: Ruud, Chuck <charles <ddudek@ppil.gov="" cc:="" dudek="" e.="" lawrence="" ruud@metaltek.cd=""> Chuck Heitzen with Learn and he folle that the 60 the Learney for the state for the office through</charles>
Allegany Ludium quoted del Price \$3.36/# + \$4.54/# SUR 	very end of July for 3000# of 1/2" thick 310SS. CHARGE= \$7.90/# total.		I takked with Larry, and he feels that the 60 lbs. is plenty for our needs. Thanks for the offer, though. Phil  From: Ruud, Chuck [milto:Charies.Ruud@metatek.com] Sent: Tuesday, Decorber 12, 2005 6:06 PM To: Phil Hearmoder
Larry Dudek X2185	310 SS Quote		Subject: R: Wed Matrial Any word? Chuck
105 Acce			I can offer a lower price for the last ½. The \$40 includes the welding and testing costs. Material is \$26/lb. To summarize 60 lbs at \$40 and the balance at \$26. Fair?
309_310.pdf (754.KB)	Search:	1657.0	Chuck Ruud Quality Manager MetalTek International Carondele Division 8600 Commercial Blvd. Pevely, MO 63070 <u>charles.rud@metaltek.com</u> 636-475-2199
Specialty Metals That Make Our World TM	310 / 310S Stainless Steel		From: Phil Heitzenroeder [mailto:pheitzen@ppbl.gov] Sent: Thursday, December 07, 2006 4:08 PM To: Ruud, Chuck; Lawrence E. Dudek Subject: Re: Veld Material
Products Stainless Steel - Austenitic - Duplex - Fertitic - Martenatitic	Austentitic stainless steel typically used for elevated temperature applications Market Applications Heat Trealing, Chemical Processing, Food Processing Industry	Technical Data Bluecheet	Chuck, Thanks for the offerLarry, what do you think should we buy it all? Chuck, we'll get back to you soon. Phil
Precipitation     Hardening     Supersustenitic     Superferitic Nickel Alloy     Corrosion Resistant     Electronic Alloys     High Temperature	Sheet         Plate         Strip           Tolerance Guide         Tolerance Guide         Tolerance Guide           Bales Contact         Sales Contact         Sales Contact           800-258-3586         800-289-7528         800-33		From: Ruud, Chuck [mailto:Charles.Ruud@metaltek.com] Sent: Tuesday, December 05, 2006 6:20 PM To: Phil Heitzerneder Subject: Weld Material
Titanium Alloyed Commercially Pure Electrical Silicon Steel Grain Oriented Silicon Steels		WHMIS (English)	We have the order for 60 pounds of weld wire. Turns out we have 141 pounds of the LNM 4455 weld wire. All from the same certified lot. Do you want to purchase all?
			Chuck Ruud Quality Manager MetalTek International

Activity ID	MILE- stones (level 2 & 3)	Activity Description	Duration (work days	Baseline Start	Baseline Finish	Shifts			Proposed Budgeted	Y07 FY08 FY09 FY10	FY11 FY12
Job: 1431 - M	lod. Co	bil Interface Hardware-DUDEK									
Bladders											
1421-3022		Receive first 5 Bladders	10	02JUL07*	16JUL07		45		0.00		
1421-3023		Test Bladders	10	17JUL07	30JUL07		45		0.00	n	
1421-3024		Prep Req, Bid,& Award Bladders	10	31JUL07	13AUG07		45		0.00		
1421-3025		Deliver bladders	5	14AUG07	20AUG07		45		16,396.60		
1421-3028		Bladders available for FPA	0		20AUG07		45		0.00		
Bushings										•	
		T		1							
1421-3105		Prep Req, Bid,& Award Bushings	15	01MAY07	21MAY07		59		0.00		
1421-3106		Deliver Bushings Material	29	22MAY07	02JUL07		59		10,271.80	l41=08\$k ;	
1421-3107		PPPL Machine bushings Bushings	248	01AUG07*	29JUL08		39		43,915.58	EMT/TB =554 ;	
1421-3108		Bushings available for first coil-to-coil fitup	0	29AUG07			39		0.00		
1421-3109		All Bushings delivered	0		29JUL08		105		0.00		
Shims-Outboa	rd										
1429-3059		Requisition,Bid,Award Shim Stock (out & inboard)	15	01AUG07	21AUG07		18		0.00		
1429-3060		Deliver Shim Stock	10	22AUG07	05SEP07		18		77,274.56	41=60.556\$k :	
1429-3062		PPPL Cut, Grind, debur Outboard Shims	130	06SEP07	18MAR08		18		19,227.06	emt/tb=187hrs;41=3.35k	
1429-3065		Prep Req, Bid, Award Alumina Application	15	27JUL07	16AUG07		36		0.00	3days to cut,debur, grind per joint,	anneal
1429-3065		Apply Alumina to OutboardShims	130	13SEP07	25MAR08		18		42,152.99	41=32.3\$k ;	
					ZJIVIARUO					qoute = 10-15 days for all;say 3 da	ys/3 pack
1429-3069		Outboard Shims Available for 1st 3 pack MC assy	0	20SEP07			18		0.00		
S21-5.04X	2	Shims required for 1st 3 pack MC assy	0	310CT07			0		0.00		
1429-3070		Outboard Shims Available for 2nd 3 pack MC assy	0	180CT07			83		0.00		
1429-3071		Outboard Shims Available for 3rd 3 pack MC assy	0	03DEC07			90		0.00		
1429-3072		Outboard Shims Available for 4th 3 pack MC assy	0	23JAN08			113		0.00		
1429-3073		Outboard Shims Available for 5th 3 pack MC assy	0	20FEB08			159		0.00		
1429-3074		Outboard Shims Available for 6th 3 pack MC assy	0	26MAR08			187		0.00	<b></b>	
Shims-Inboard											
1429-3062X		PPPL cut, grind and debur Inboard Shims	130	12SEP07	24MAR08		54		19,258.90	emt/tb=187hrs;41=3.35k 2 days to cut, debur and grind per	
1429-3069X		Inboard Shims Available for 1st 3 pack MC assy	0	19SEP07			54		0.00	→ 2 days to cut, debur and grind per	joint
1429-3070X		Inboard Shims Available for 2nd 3 pack MC assy	0	17OCT07			84		0.00		
1429-3071X		Inboard Shims Available for 3rd 3 pack MC assy	0	28NOV07			109		0.00		
1429-3072X		Inboard Shims Available for 4th 3 pack MC assy	0	22JAN08			132		0.00		
1429-3073X		Inboard Shims Available for 5th 3 pack MC assy	0	19FEB08			167		0.00		
1429-3074X		Inboard Shims Available for 6th 3 pack MC assy	0	25MAR08			194		0.00		
111					1	II		I			
Run Date	18J	UL07 07:31	ETCZ		CSX Project		Sheet 21 o	of 99			
© Primave				Resourc	e Loaded Sche EAC	aule					

ID	MILE- stones	Activity Description	Duration (work	Baseline Start	Baseline Finish	Shifts	Total Float	% cmplt	Proposed Budgeted	-							
	(level 2		days	Otart	1 111311		Tioat	empic	Dudgeted	FY07	FY	08	FY09	FY10		-Y11	FY1
hims- C-C Jo	& 3) Dint																
		Г		1	I	1											
429-3062C		PPPL Cut, Grind, debur Outboard Shims	10	01OCT09*	14OCT09		12		8,170.84					emt/tb=74 2 days to	hrs;41=1 cut, debu	.3k r and grin	d per jo
429-3066C		Apply Alumina to OutboardShims	40	08OCT09	04DEC09		12		9,308.00					41=6.59 qoute =			
429-3075X		Shims Req'd for C-C joint	0	07DEC09			12		0.00					$\overline{\nabla}$			
tuds,Washer	rs,Nuts																
404 0000		Deliver Official Kit (DE007020) (fee det 0 week en be	<b>F7</b> *	04844 2074	00 11 11 07				98,992.08		7001						
421-3060		Deliver Stud Kit (PE007330) (for 1st 3 pack only	57*	01MAY07A	20JUL07		66				=78\$K						
421-3061		Stud kit available for 1st 3 pack MC assy	0	40 11 10 07	20JUL07		66		0.00		144 04	0.01					
421-3062		Re-order balance of stud kits	65	19JUL07	180CT07 180CT07		78 78		408,475.32		41=31	∠ък;					
421-3063 421-3065		Stud kits available for balance of MC assy	0 22*	01MAY07A	31MAY07				0.00	141_1	V 122 754						
421-3065		Deliver Superbolts (PE007332) Order Add'l stud kits for c-c joint&weld clmp	15	010CT07*	190CT07		101 181			<b>1</b> 41=1	123.73K	,					
421-3070			30		04DEC07		181		0.00 59,827.92		■ ■41	15.738k					
421-3072		Deliver Add'I stud kits for c-c joint&weld clmp Purchase G-11 shims and machine for C-C inboard	65	22OCT07 01OCT07*	10JAN08		497		59,827.92				em//tb=48				
421-3066		Super bolts available for FPA	0	0100107	31MAY07		101		0.00			-1.448	5111/710-40				
isc Tech Sho	on Supr	-	0		JIMATO		101		0.00	V							
421-4000		Misc Tech Shop support through FPA sta 3	250*	01OCT07*	30SEP08		999	LOE	76,905.60		 		em//tb=960				
421 4000				1													
ubtotal			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								
			0		04DEC09		705		1,053,811.05								

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