CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	1994
DateRun:	09/11/1994
Experimenters:	John Bulko
ClientType:	Electro-Optical Devices
ProjectNumber:	Project #1
Substrates:	Alloys, Ceramics, Copper, Glass/Quartz, Nickel
PartType:	Part
Contaminants:	Dirt, Oil
Cleaning Methods:	
Analytical Methods:	Goniometry, OSEE
Purpose:	Request for approval & information
Experimental Procedure:	We are shipping out the samples for our cleaning comparison to be performed by the lab. We have made a couple of changes in the items: 1. The nickel piece is a large flat disc. 2. The monel piece is of two different configurations. The samples will be labeled as follows: Copper - #'s 1, 2, 3, 4 &5 Kovar - #'s 1, 2, 3, 4 & 5 Ceramic - #'s 1, 2, 3 & 4 Nickel - #'s 1, 2, 3 &4 Tungsten - #'s 1, 2, 3 & 4 Molybdenum - #'s 1, 2, 3 &4 Monel - #'s 1, 2 &3 Quartz - #'s 1, 2 &3 BACKGROUND: There are currently four chemical labs in our facility that process similar or identical materials independent of the others due to the fact that they belong to separate business elements. In most cases the cleaning/processing is slightly different for each department. We are currently in an effort to reduce our wastes produced as a facility. By doing so we are trying to consolidate our chemical lab processing. PLAN: Send you (SCL) samples of selected parts (based upon the material) that have been cleaned by each of our departments utilizing that material. Then accompanying each part/material selection will be a sample that has been cleaned by a chosen new method. The new methods are ones that do not use chlorinated solvents, ozone depleting chemicals, are non-hazardous, etc. We wish to compare the current methods to the new methods not only to prove in the new methods but to establish a baseline to compare them to. Could you please look this information over and get back to me with your concerns and possibly a time frame that this work can be completed. If you need further information please do not hesitate to call. We will be speaking to you in the near future.
Results:	OSEE readings were taken for all samples except for the Molybdenum due to its small size. For each sample, OSEE readings were taken at 10 second intervals for one minute. Due to the nature of Quartz readings, readings were not able to be taken every 10 seconds. The peak readings were taken instead. The average reading for the Quartz was 159.57 while the average reading for the Quartz #1 sample was 38.50. The results from all other OSEE readings are shown below.

OSEE TESTS

		OSEE TESTS					GONIOMETER
SAMPLE	TIME (S)	OSEE1	OSEE2	OSEE3	OSEE4	AVG OSEE	ANGLE
COPPER 3	0	70	56	42		56.00	70.00
	10	56	50	35		47.00	60.00
SENSOR GAIN	20	51	46	32		43.00	75.00
SET AT 7	30	47	44	30		40.33	80.00
	40	45	42	28		38.33	80.00
	50	42	40	27		36.33	
	60	41	39	26		35.33	
						AVERAGE	73.00
		OSEE TESTS					GONIOMETER

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SAMPLE	TIME (S)	OSEE1	OSEE2	OSEE3	OSEE4	AVG OSEE	ANGLE
COPPER #5	0	378	288	316		327.33	83.00
	10	310	258	279		282.33	85.00
SENSOR GAIN	20	288	243	259		263.33	80.00
SET AT 7	30	278	235	247		253.33	85.00
	40	272	228	239		246.33	
	50	262	225	232		239.67	
	60	255	219	225		233.00	
						AVERAGE	83.25
		OSEE TESTS					GONIOMETER
SAMPLE	TIME (S)	OSEE1	OSEE2	OSEE3	OSEE4	AVG OSEE	ANGLE
KOVAR #3	0	102	85	70		85.67	80.00
	10	93	82	70		81.67	70.00
SENSOR GAIN	20	81	77	66		74.67	70.00
SET AT 7	30	73	76	67		72.00	68.00
	40	70	75	65		70.00	
	50	69	72	65		68.67	
	60	66	72	63		67.00	
						AVERAGE	72.00
		OSEE TESTS					GONIOMETER
SAMPLE	TIME (S)	OSEE1	OSEE2	OSEE3	OSEE4	AVG OSEE	ANGLE
KOVAR #5	0	53	53	46		50.67	30.00
	10	44	52	46		47.33	35.00
SENSOR GAIN	20	41	52	45		46.00	20.00
SET AT 7	30	39	50	44		44.33	30.00
	40	37	49	44		43.33	
	50	36	48	44		42.67	
	60	35	47	43		41.67	
						AVERAGE	28.75
		OSEE TESTS					GONIOMETER
SAMPLE	TIME (S)	OSEE1	OSEE2	OSEE3	OSEE4	AVG OSEE	ANGLE
CERAMIC #3	0	31	24	19		24.67	
	10	17	10	17		14.67	
SENSOR GAIN	20	15	8	12		11.67	
SET AT 0	30	14	7	10		10.33	
	40	13	7	9		9.67	
	50	13	7	9		9.67	
	60	13	7	9		9.67	
						AVERAGE	#DIV/0!
		OSEE TESTS					GONIOMETER
SAMPLE		OSEE1	OSEE2	OSEE3	OSEE4		ANGLE

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	TIME (S)					AVG OSEE	
CERAMIC #4	0	25	25	15		21.67	
	10	21	11	7		13.00	
SENSOR GAIN	20	17	7	5		9.67	
SET AT 0	30	16	7	5		9.33	
	40	16	7	5		9.33	
	50	15	7	5		9.00	
	60	15	6	5		8.67	
						AVERAGE	#DIV/0!
		OSEE TESTS					GONIOMETER
SAMPLE	TIME (S)	OSEE1	OSEE2	OSEE3	OSEE4	AVG OSEE	ANGLE
NICKEL #3	0	182	159	205		182.00	70.00
	10	245	233	210		229.33	65.00
SENSOR GAIN	20	193	196	177		188.67	70.00
SET AT 9	30	180	178	160		172.67	
	40	169	165	152		162.00	
	50	165	157	142		154.67	
	60	157	151	137		148.33	
						AVERAGE	68.33
		OSEE TESTS					GONIOMETER
SAMPLE	TIME (S)	OSEE1	OSEE2	OSEE3	OSEE4	AVG OSEE	ANGLE
NICKEL #1	0	108	125	245		159.33	85.00
	10	759	681	876		772.00	82.00
SENSOR GAIN	20	694	630	802		708.67	85.00
SET AT 9	30	646	610	767		674.33	80.00
	40	612	583	748		647.67	
	50	591	577	735		634.33	
	60	579	555	717		617.00	
						AVERAGE	83.00
		OSEE TESTS					GONIOMETER
SAMPLE	TIME (S)	OSEE1	OSEE2	OSEE3	OSEE4	AVG OSEE	ANGLE
TUNGSTON #3	0	126	184	195	108	153.25	40.00
	10	270	462	262	260	313.50	38.00
SENSOR GAIN	20	251	360	208	229	262.00	45.00
SET AT 8	30	244	333	195	215	246.75	39.00
	40	235	312	185	207	234.75	40.00
	50	229	300	176	197	225.50	42.00
	60	225	288	169	191	218.25	45.00
						AVERAGE	41.29
		OSEE TESTS					GONIOMETER
SAMPLE	TIME (S)	OSEE1	OSEE2	OSEE3	OSEE4	AVG OSEE	ANGLE

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TUNGSTON #4	0	262	122	184	181	187.25	17.00
	10	502	210	322	253	321.75	15.00
SENSOR GAIN	20	455	180	279	224	284.50	27.00
SET AT 8	30	418	174	263	214	267.25	23.00
	40	399	168	249	206	255.50	22.00
	50	384	164	238	198	246.00	20.00
	60	367	160	230	193	237.50	20.00
						AVERAGE	20.57
		OSEE TESTS					GONIOMETER
SAMPLE	TIME (S)	OSEE1	OSEE2	OSEE3	OSEE4	AVG OSEE	ANGLE
MONEL #2	0	47	132			89.50	83.00
	10	191	187			189.00	80.00
SENSOR GAIN	20	155	169			162.00	85.00
SET AT 8	30	141	160			150.50	80.00
	40	135	150			142.50	
	50	126	140			133.00	
	60	120	134			127.00	
						AVERAGE	82.00
		OSEE TESTS					GONIOMETER
SAMPLE	TIME (S)	OSEE1	OSEE2	OSEE3	OSEE4	AVG OSEE	ANGLE
MONEL #3	0	64	91			77.50	70.00
	10	89	167			128.00	62.00
SENSOR GAIN	20	80	150			115.00	72.00
SET AT 8	30	76	138			107.00	75.00
	40	73	131			102.00	
	50	71	126			98.50	
	60	69	122			95.50	
						AVERAGE	69.75

Summary:

Conclusion: Goniometry tests were done on every sample except for the ceramic, quartz and molybdenum because of the shape of the samples.