Emission Assessment for Molten Solder Surfactant

Prepared for

P K Metal 2448 E. 25th Street Vernon, CA 90058

Prepared by

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April 18, 2006

Emission Assessment for Molten Solder Surfactant

1 INTRODUCTION

At the request of Larry Kay, president of P.K. Metal, consultant James Unmack, PE, CIH, CSP, evaluated the emissions from MS2TM Molten Solder Surfactant.

2 SUMMARY

Chemical analysis of air samples collected above a wave solder machine operating with MS2 molten solder surfactant detected no emissions from the molten solder surfactant. There was no visible fume, smoke or soot emitted from the molten solder surfactant. A faint odor and ultrafine particles were detected close to the surface of the molten solder surfactant. No hazardous emissions were detected from the surfactant.

3 BACKGROUND

MS2 molten solder surfactant is a unique product developed to eliminate dross from molten solder baths. Dross is formed from metal oxides that float on molten solder and is formed when molten solder comes into contact with oxygen. In wave solder operations, the dross may be as much as 70 % solder. MS2 is an organic material made from fatty acids. The concern is that it may volatilize or decompose at molten solder temperature, 175 - 300 C (350 - 575 F) and emit hazardous material.

4 METHOD

4.1 Total Hydrocarbons

Air samples for analysis by National Institutes of Occupational Safety and Health (NIOSH) Method 1550 for total hydrocarbons were collected over the wave of a wave solder machine. A personal sampling pump was used to pull 10 liters of air at 0.25 liters per minute through an SKC 226-01 charcoal tube. The charcoal tube was capped after 40 minutes of sampling and submitted to DataChem Laboratories in Salt Lake City, Utah, where it was analyzed by gas chromatography with a flame ionization detector (GC/FID).

4.2 Total Particulates

The release of fume and smoke was evaluated by measuring the total particulates in the space above the molten solder surfactant during the operation of a wave solder machine. Air samples were collected by using a personal sampling pump to draw approximately 500 liters of air at 5 liters per minute through matched weight PVC membrane filters. The matched weight filters were submitted to DataChem Laboratories in Salt Lake City, Utah, for analysis by NIOSH Method 0500 to measure total weight gain.

4.3 Breakdown Products

To evaluate release of volatile breakdown products a personal sampling pump was used to pull 10 liters of air through SKC 226-01 charcoal tubes at 0.25 liters per minute. Samples were collected over the molten solder bath of an operating wave solder machine and submitted to DataChem Laboratories in Salt Lake City, Utah, for analysis by gas chromatograph/mass spectrometer (GC/MS).

4.4 Ultrafine Particulate Matter

Ultrafine particles were investigated with a TSI P-Trak, model 8525, serial number 8525-06011018. The P-Trak uses forward scattering nephalometry to count particles with an aerodynamic diameter of 0.02 micrometer to greater than 1 micrometer. The counts are displayed as the number of particles per cubic centimeter (UFP/cm³). The counts were datalogged at 1.0 second intervals. The P-Trak does not discriminate between particles, but responds to all particles in the size range 0.02 to 1 micrometer. Typical particles in this size range include viruses, bacteria, combustion nuclei, sea salt nuclei, atmospheric dust, metal fumes, smoke from various sources and condensation nuclei of hygroscopic molecules.

5 RESULTS

To evaluate the emissions from the molten solder surfactant, a Compac 1025 PCS and an Electrovert Speedline Technologies wave solder machine were charged with lead-free solder and heated to 247 C. Analysis of the solder is included in the Attachment 1. After the operation had stabilized and the bath completely covered by dross, MS2 - 200LF molten solder surfactant was added to the bath. After a few minutes the dross was completely eliminated. Once the operation had stabilized, sample collection filters and charcoal tubes were arranged over the Compac 1025

PCS wave solder bath to sample the air directly above the solder wave 10 to 12 inches above the surface of the bath.

5.1 Total Volatile Organic Compounds

Total volatile organic compounds (VOCs) as hydrocarbons were not detected in the air above the molten solder surfactant. Expressed as hexane equivalent, the detection limit was 0.28 parts per million.

Table 5-1 Total Volatile Organic Compounds

Sample	PK-4			
Airborne Concentration	<0.01 mg/m³, <0.28 ppm			

5.2 Total Particulates

Three samples were collected directly above the molten solder to evaluate fume, soot or smoke from the molten solder surfactant during the operation of a wave solder machine. No visible smoke or other emission was observed from the surface of the solder bath. The airborne particulate averaged 0.33 milligrams per cubic meter (0.33 mg/m³).

Table 5-2 Total Particulates

Sample	PK-1	PK-2	PK-3	
Airborne Concentration	0.24 mg/m³	0.40 mg/m³	0.35 mg/m ³	

5.3 Breakdown Products

Large and complex molecules can split into smaller and more volatile compounds when heated or exposed to air. To evaluate release of volatile breakdown products two samples were collected in the space directly above the wave solder machine. No breakdown product were detected.

Table 5-3 Volatile Organic Compounds

Sample	PK-5	PK-6		
Methyl ethyl ketone	ND, <0.17 ppm	ND, <0.17 ppm		

Table 5-3 Volatile Organic Compounds

Sample	PK-5	PK-6
Hexane	ND, <0.014 ppm	ND, <0.014 ppm
Tetrahydrofuran	ND, <0.017 ppm	ND, <0.017 ppm
Chloroform	ND, <0.010 ppm	ND, <0.010 ppm
1,1,1-Trichloroethane	ND, <0.0092 ppm	ND, <0.0092 ppm
1,2-Dichloroethane	ND, <0.012 ppm	ND, <0.012 ppm
Benzene	ND, <0.016 ppm	ND, <0.016 ppm
n-Butanol	ND, <0.066 ppm	ND, <0.066 ppm
Cyclohexane	ND, <0.015 ppm	ND, <0.015 ppm
Cyclohexene	ND, <0.015 ppm	ND, <0.015 ppm
2-Pentanone	ND, <0.014 ppm	ND, <0.014 ppm
Trichloroethylene	ND, <0.0093 ppm	ND, <0.0093 ppm
n-Propyl acetate	ND, <0.012 ppm	ND, <0.012 ppm
Methyl isobutyl ketone	ND, <0.012 ppm	ND, <0.012 ppm
Toluene	ND, <0.013 ppm	ND, <0.013 ppm
1,1,2-Trichloroethane	ND, <0.0092 ppm	ND, <0.0092 ppm
Octane	ND, <0.011 ppm	ND, <0.011 ppm
Tetrachloroethylene	ND, <0.0074 ppm	ND, <0.0074 ppm
n-Butyl acetate	ND, <0.011 ppm	ND, <0.011 ppm
Chlorobenzene	ND, <0.011 ppm	ND, <0.011 ppm
Ethylbenzene	ND, <0.012 ppm	ND, <0.012 ppm
Xylene	ND, <0.035 ppm	ND, <0.035 ppm
Styrene	ND, <0.012 ppm	ND, <0.012 ppm
Cellosolve acetate	ND, <0.0093 ppm	ND, <0.0093 ppm
Cumene	ND, <0.010 ppm	ND, <0.010 ppm

Table 5-3 Volatile Organic Compounds

Sample	PK-5	PK-6
Methyl styrene	ND, <0.010 ppm	ND, <0.010 ppm
1,3-Dichlorobenzene	ND, <0.0083 ppm	ND, <0.0083 ppm
1,4-Dichlorobenzene	ND, <0.0083 ppm	ND, <0.0083 ppm
1,2-Dichlorobenzene	ND, <0.0083 ppm	ND, <0.0083 ppm
Naphthalene	ND, <0.0095 ppm	ND, <0.0095 ppm

5.4 Ultrafine Particles

Both the Compac 1025 and the Electrovert Speedline wave solder baths were surveyed with the ultrafine particle counter with similar results. The ultrafine particle counter detected an emission from the molten solder surfactant when heated to the solder bath temperature. The TSI P-Trak ultrafine particle counter saturates at 500,000 particles per cubic centimeter. The P-Trak saturated when the probe was within 2 to 3 inches of the surfactant, but dropped to room levels when more than 6 inches from the surface. The ultrafine particle counts are presented graphically in Attachment 2.

6 DISCUSSION

No visible emission was detected from the molten solder surfactant, but a faint odor indicated that there was some release from the product. The small amount of release was detectable with the ultrafine particle counter, but was not detected by any of the air samples collected for laboratory analysis. The results of the laboratory analysis of air samples collected above the wave solder machine do not indicate any hazardous concentration of material evolving from the molten solder surfactant at operating temperature.

7 CONCLUSION

No hazardous emissions were detected from the MS2 - LF200 product when heated to 247 C (477 F). There was no visible emission of fume, smoke or soot, but a faint odor and ultrafine particles were detected close to the heated surface.

8 SIGNATURE

This report of emissions from MS2 - LF200 was prepared by the undersigned and is based on measurements as detailed herein and information provided by Larry Kay.

1 Lumork

James L. Unmack, PE, CIH, CSP

amer L. Unmack

Date

4-18-06

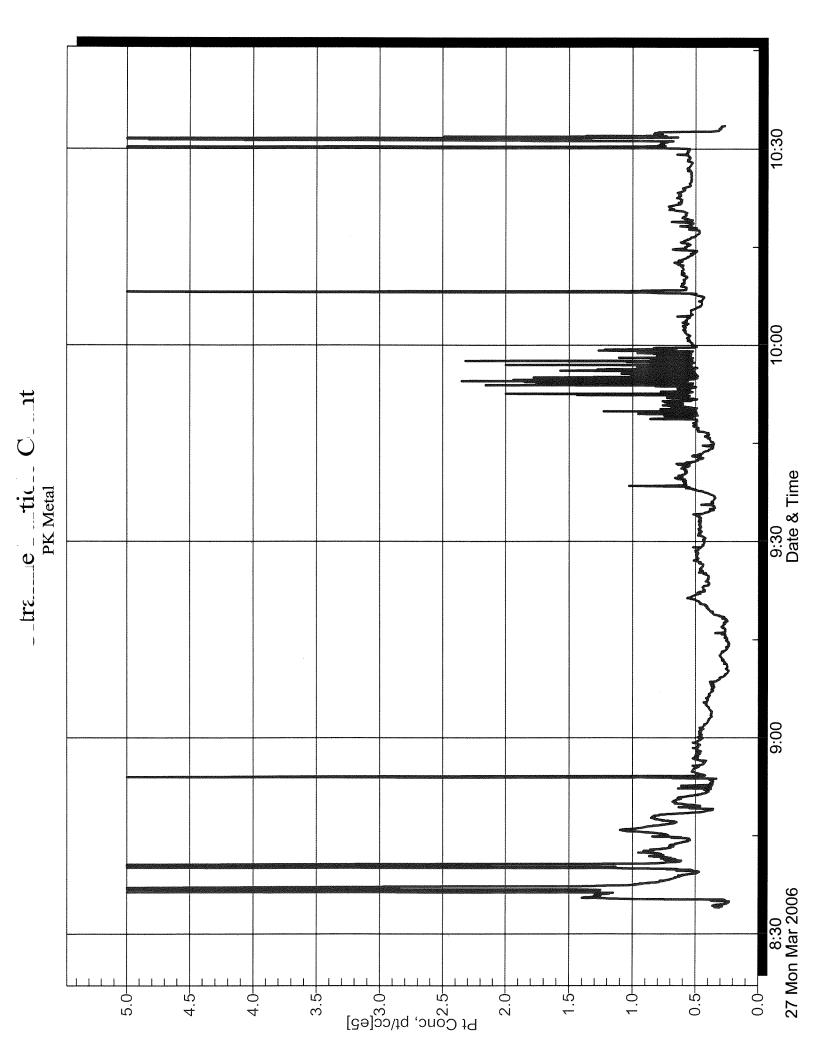
Solder Analysis

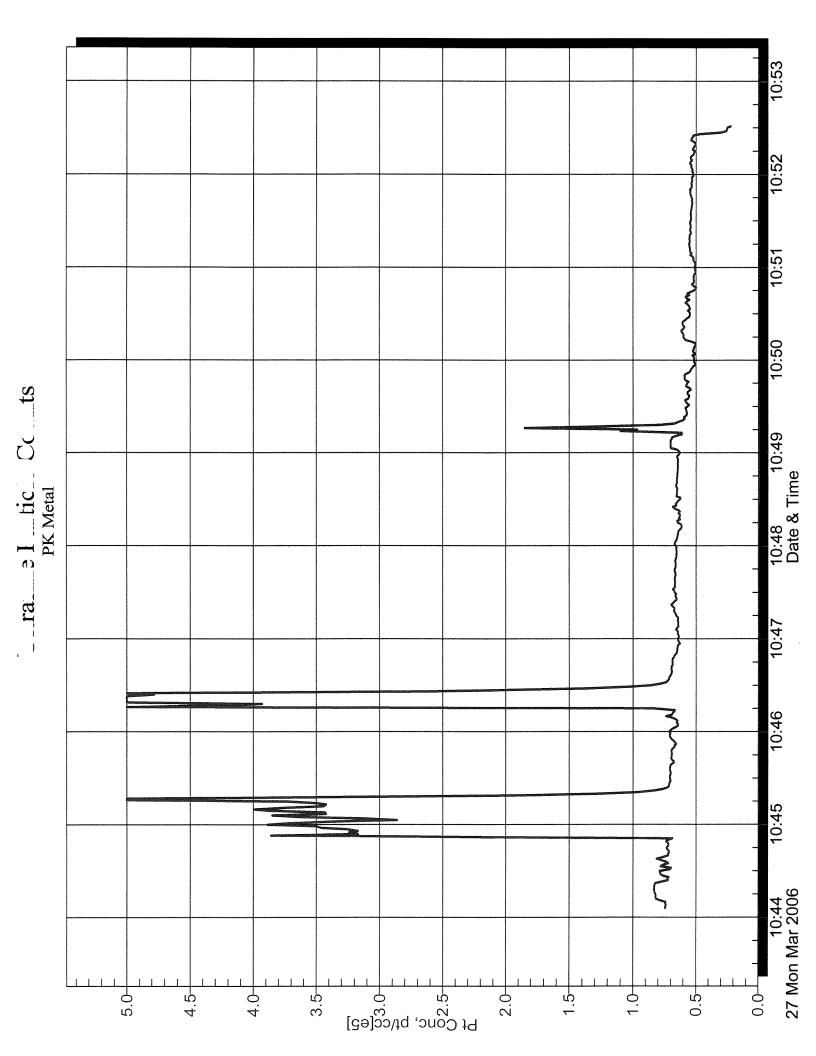
Lead-Free Solder

Sn	Tin	96.4 %
Ag	Silver	2.995 %
Cu	Copper	0.503 %
Pb	Lead	0.0356 %
Sb	Antimony	0.0208 %
In	Indium	0.0037 %
Au	Gold	0.0005 %
		99.9586 %

Attachment 2

Ultrafine Particle Counts





Attachment 3

Laboratory Reports



Form ARF-AL Page 1 of Part 1 of 04040607194581RX

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1379 Park #282	rporation Jim Unmac Western Dr , CA 90732-	ive				E-mail	T jim@ur	elephon	X (310) e (310)	377–2589 377–2367	<u>.</u> Z
Sampling C	Collection a	and Shi	pment			Date of	Collec	ction Ma	rch 27,	2006	
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Analysis	Method of Date(s) of	-		*							
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Form ARF-C Page 2 of 2 04040607194581RX

Date		APR	0 5	2006	
Laboratory	Group	Name	06	<u>[_1458_0</u>	1

General Set Comments

Results are not blank-corrected.

General Lab Comments

The results provided in this report relate only to the items tested. Samples were received in acceptable condition unless otherwise noted in the General Set Comments above.

Samples have not been field blank corrected unless otherwise noted in the General Set Comments above.

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ANALYTICAL REQUEST FORM

DAT			1. REGULAR	06I-1458-01	
CH	IEM		RUSH Sta	tus Requested - ADDITIONAL CHARGE REQUIRED BY	s
Address 1-3 Person to Contact Telephone (3 to) Fax Telephone (310)	NMACK (79 PARK N PEDRO, J.M UNM, 377-236 377-258 IM DUNM	012 POG WESTE CA 90° 9CK 7	2ATION 12N DR 2 732-221	Sampling Site Industrial Process Date of Collection Time Collected	
REQUEST FOR ANALY	SES Cilent Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Unils**
	PK-1	F	480	NOSH 500	
76I 11862	<u> </u>	F	580	N1054 500	-
1 63	1514-5				-
¥ 64	PK-3	F	520	TOTAL HYDROCARBONS	4118
	PK.4	CT	10,25	TOTAL HYDROCARSONS	╂
	アベ-5	CT	10	VOC by GC/MS	
	₽K-0	CT	10	Voc By GC/MS	
Specify: Solid sorbent to * 1. mg/sample 2. mg/m Comments	ube, e.g. Charcoal; Filter ty 3 3. ppm 4. % 5	pe; Impinger s	iolution; Bulk sampl Please Indicate one	e; Blood; Urine; Tissue; Soil; Water; Other or more units in the column entitled Units**	
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Form ARF-AL Page of

Part 1 of 1 04030614585214RX

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Analysis	Method of	Analys	sis NMAM	1550			· .	***************************************	:		
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\nalytical	l Results										
Field Sample Number	Laboratory Number	Sample Type	Total Hydrocarbons mg/sample GC/FID	Total Hydrocarbons Ppm GC/FID	Air Volume Liters						
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Form ARF-C
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Date	APR 0 A	2006		
Laboratory	Group	Name	061-1458-02	

General Set Comments

Total Hydrocarbons is the sum of all peaks minus solvent peaks and was quantitated against hexane.

ppm formula: (24.45 * (Result * 1000)) / (Volume * MW)

General Lab Comments

The results provided in this report relate only to the items tested. Samples were received in acceptable condition unless otherwise noted in the General Set Comments above.

Samples have not been field blank corrected unless otherwise noted in the General Set Comments above.

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ANALYTICAL REQUEST FORM

1. A REGULAR Status 06 Z - 1458 - 02

	IEM.		RUSH Status Requested - ADDITIONAL CHARGE RESULTS REQUIRED BY DATE CONTACT DATACHEM LABS PRIOR TO SENDING SAMPLES					
Person to Contact	NMACK (79 PARK U PEDRO, JIM UNM, 377-236 377-258 IM QUNM	0 R P O P WESTE CA 905 ACK 7	-ATION RNDR ² 737-221	Industrial Process Date of Collection Time Collected				
Laboratory Use Only	SES Client Sample Number	Matrix*	Sample Volume	ANALYSES REQUESTED - Use method number if known	Units**			
	PK-1	F	480	NOSH 500				
	PK-2	F	580	NIOSH 500				
	PK-3	F	520	NOSH 500				
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	アベック	CT	10	VOC by GC/MS				
	PK-6	CT	10	VOCBY GC/MS				
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Hg/sample 1,2-Dichloro ethane 4g/sample gg/sample n-Butanol n-Butanol
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960 West LeVoy Drive / Salt Lake City, Utah 84123-2547 Phone (801) 266-7700 Web Page: www.datachem.com FAX (801) 268-9992 E-mail: lab@datachem.com



Form ARF-AL
Page 2 of 9
Part 2 of 8
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Part 3 of 8
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Form ARF-AL

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6111866	TUBE	<0.014	<0.0093	<0.012	<0.012				<0.0074
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	Western Dr CA 90732- collection a Sampling S Date Sampl Method of Date(s) of Results Laboratory	Jim Unmack Western Drive CA 90732-2217 Dilection and Shi Sampling Site Date Samples Rec Method of Analys Date(s) of Analy Results Laboratory Sample Type DETILEGE TUBE DETILEGE TUBE	Jim Unmack Western Drive CA 90732-2217 Dilection and Shipment Sampling Site Date Samples Received a Method of Analysis DCL Date(s) of Analysis April Results Laboratory Sample Type Sample Type GEILISES TUBE <0.014	Jim Unmack Western Drive CA 90732-2217 Dilection and Shipment Sampling Site Date Samples Received at Labor Method of Analysis DCL Method Date(s) of Analysis April 07, 2 Results Laboratory Sample Type Results Description of Analysis April 07, 2 Results Description of Analysis April 07, 2	poration Jim Unmack Western Drive CA 90732-2217 Edilection and Shipment Sampling Site Date Samples Received at Laboratory M Method of Analysis DCL Method Date(s) of Analysis April 07, 2006 Results Laboratory Sample of Control of Cont	poration Jim Unmack Western Drive CA 90732-2217 E-mail Callection and Shipment Sampling Site	poration Jim Unmack Western Drive CA 90732-2217 Te E-mail jim@unm Silection and Shipment Sampling Site Date of Collect Date Samples Received at Laboratory March 29, 2006 Method of Analysis DCL Method Date(s) of Analysis April 07, 2006 Results Laboratory Sample	Jim Unmack Western Drive CA 90732-2217 FAX Telephone E-mail jim@unmack.com callection and Shipment Sampling Site Date of Collection Mar Date Samples Received at Laboratory March 29, 2006 Method of Analysis DCL Method Date(s) of Analysis April 07, 2006 Results Laboratory Sample of Type of Typ	Date Sample Sam



Form ARF-AL 7 of Page Part 7 of 04100609114859X

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Date APR	1 0 2006
	Group Name 061-1458-03

Unmack Corporation Attention: Jim Unmack 1379 Park Western Drive #282 San Pedro, CA 90732-2217

Sampling Collection and Shipment

Sampling Site _____

Method of Analysis DCL Method

Date(s) of Analysis April 07, 2006

FAX (310) 377-2589 Telephone (310) 377-2367 jim@unmack.com E-mail _ Date of Collection March 27, 2006 Date Samples Received at Laboratory March 29, 2006

Account No. 07350

Analytical Results

Analysis

Field Sample Number	Laboratory Number	Sample Type	n-Butyl Acetate ppm	Chlorobenzene ppm	Ethyl Benzene ppm	Xylene ppm	Styrene ppm	Cellosolve Acetate ppm	Cumene ppm	Methyl Styrene ppm
PK-5	06111866	TUBE	<0.011	<0.011	<0.012	<0.035	<0.012	<0.0093	<0.010	<0.010
PK-6	06111867	TUBE	<0.011	<0.011	<0.012	<0.035	<0.012	<0.0093	<0.010	<0.010
Limit of De	TEOCETON				i .		:			
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See comment on last page.

ND Parameter not detected above LOD.

NR Parameter not requested.

NA Parameter not applicable.

** See comment on last page.
() Parameter between LOD and LOQ.



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4 DO 4 D 2006

A Sorei	son Company				I	Date	APK I	0 2000			
							orv Gro	up Name	061-145	8-03	
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Unmack Con Attention	rporation : Jim Unmac	.k	,								
1379 Park #282	Western Dr	ive						PAY	7 (210)	377-258	3
San Pedro	, CA 90732-	-2217			I	E-mail	Te jim@un	elephone	(310)	377-236	-
Sampling C	Collection a							•			
	Sampling S	Site				Date of	Collec	tion <u>Ma</u>	rch 27,	2006	
	Date Sampl	l es Red	seived a	t Labor	ratory_M	larch 29	2006	er en	-		
Analysis	North Start	A		, Makhad	1						
	Method of										
	Date(s) of	f Analy	ysis Apr	11_07,	2006	*			;		
Analytical	. Results								,		
Field Sample Number	Laboratory Number	Sample Type	1,3-Dichloro benzene ppm	1,4-Dichloro benzene ppm	1,2-Dichloro benzene ppm	Naphthalene ppm	Air Volume liters				•
K-5	06111866	TUBE	<0.0083		<0.0083		10				-
R-6	06111867	TUBE	<0.0083	<0.0083	<0.0093	<0.0095	10		<u> </u>		
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APR 1 0 2006

Date			
Laboratory	Group	Name	061-1458-03

General Set Comments

ppm formula: (24.45 * Result) / (Volume * MW)

General Lab Comments

The results provided in this report relate only to the items tested. Samples were received in acceptable condition unless otherwise noted in the General Set Comments above.

Samples have not been field blank corrected unless otherwise noted in the General Set Comments above.

This test report shall not be reproduced, except in full, without written approval of DataChem Laboratories, Inc.

This page is the concluding page of the report.



ANALYTICAL REQUEST FORM

1. SREGULAR Status 06Z-1458-03

Company Name Address 1379 PARK WEST-URN DE Sample Collection Sempling Site Industrial Process Date of Collection Sempling Site Industrial Process Date of Collection Time Collected Date of Collection Time Collected Date of Shipment Chain of Custody No. REQUEST FOR ANALYSES Laborstory Use Dnly Clast Sample Number Metrix Sample Volume ANALYSES REQUESTED - Use mathod number if known Units** PK-1 F 480 NoSH 500 PK-3 F 520 NoSH 500 PK-3 F 520 NoSH 500 PK-4 CT (0,75 Total Hypercollected) The Collection Time Collected Date of Shipment Chain of Custody No. ** ** ** ** ** ** ** ** **	CF LABORA 3-27-06	TEM TORIES, INC.	704-	RESULTS CONTAC	REQUIRED BY DATE DATE DATACHEM LABS PRIOR TO SENDING SAMPLE 4. Quote No.	
Laboratory Use Only Client Sample Number Matrix* Sample Volume ANALYSES REQUESTED - Use method number in known Unitary PK-1 F 4 80 Nost 500 PK-2 F 580 Nost 500 PK-3 F 520 Nost 500 PK-3 F 520 Nost 500 PK-4 CT (0.25 Total Hydrocan 8-MSTANS Not 4 4 20 CT (0.25 Total Hydrocan 8-MSTANS Not 4 5 CT (0.25 Total Hydrocan 8-MSTANS Not 4 5 CT (0.25 Total Hydrocan 8-MSTANS Not 4 5 CT (0.25 Total Hydrocan 8-MSTANS Not 5 CT (0.25 Total Hydrocan 8-MSTANS Not 6 7 PK-4 CT (0.25 Total Hydrocan 8-MSTANS Not 6 7 PK-4 CT (0.25 Total Hydrocan 8-MSTANS Not 6 7 PK-4 CT (0.25 Total Hydrocan 8-MSTANS Not 6 7 PK-4 Possible Contamination and/or Chemical Hazards Total of Custody (Optional) Relinquished by Received by Relinquished by Relinquished by Relinquished by Date/Time Date/Time Date/Time Date/Time Date/Time Date/Time Date/Time Date/Time	Address 1.3 Person to Contact 1.3 Telephone (3.4) Fax Telephone (7.4) E-mail Address 1.3	NMACK (79 PARK N PEDRO, J,M UNM, 377-236 377-258 I,M QUNM	0 12 17 0 18 WESTE CA 907 ACK 7	132-2217	DCL Project Manager 5. Sample Collection Sampling Site Industrial Process Date of Collection Time Collected Date of Shipment	
PK-1 F	REQUEST FOR ANAL)	/SES			L. House	11-11-99
PK-3 F 520 N/05/4 500 PK-4 CT [0.79 ToTAL HYDROCARBONS FANS NOT 1/866 PK-5 CT 10 VOC by CTC/MS PK-6 CT 10 VOC by CTC/MS PK-9 FK-6 CT 10 VOC by CTC/MS PK-9 FK-9 CT 10 VOC by CTC/MS Other Please indicate one or more units in the column entitled Units** Comments Possible Contamination and/or Chemical Hazards Contamination of Custody (Optional) Relinquished by Received by Received by Relinquished by Public Market			Matrix*	Sample Volume		Units
PK-3 F 520 NioSH 500 PK-4 CT (0.25 ToTAL Hyprocard and and series are series and series are series and series and series and series and series are series and series and series and series are series and series and series are series and series and series are series and series and series and series are series and series and series are series and series		PK-1	F	480		
PK-4 CT (0.75) TOTAL HYDROCARSONS FANS 267 PK-5 CT (0 VOC by CTC/M5 VOC by CTC/M5 PK-G CT 10 VOC by CTC/M5 PSpecify: Solid sorbent tube, e.g. Charcosi; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soli; Water; Other 1. mg/sample 2. mg/m³ 3. ppm 4. % 5. (other) Please Indicate one or more units in the column entitled Units** Possible Contamination and/or Chemical Hazards 7. Chain of Custody (Optionel) Relinquished by Received by Relinquished by Date/Time Date/Time Date/Time		PK-2	F	580	N1054 500	
Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soli; Water, Other 1. mg/sample 2. mg/m³ 3. ppm 4. % 5		PK-3	F	520	NIOSH 500	1 1 NS
Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk sample; Blood; Urine; Tissue; Soli; Water, Other 1. mg/sample 2. mg/m³ 3. ppm 4. % 5		PK.4	CT	10,25	TOTAL HYDROCARBONS	-
Specify: Solid sorbent tube, e.g. Chercost; Filter type; implinger solution; Bulk sample; Blood; Urine; Tissue; Solt; Water; Other 1. mg/sample 2. mg/m³ 3. ppm 4. % 5 (other) Please indicate one or more units in the column entitled Units** Comments Possible Contamination and/or Chemical Hazards 7. Chain of Custody (Optional) Relinquished by Received by Received by Public Water March Marc	XT 11866	PK-5	CT	10	VOC by GC/MS	<u> </u>
** 1. mg/sample 2. mg/m³ 3. ppm 4. % 5 (other) Please indicate one of more units in the column shifted comments Possible Contamination and/or Chemical Hazards 7. Chain of Custody (Optional) Relinquished by Received by Relinquished by	¥ 67	りK-0	CT	10	Voc By Ge/MS	
** 1. mg/sample 2. mg/m³ 3. ppm 4. % 5 (other) Please indicate one of more units in the column shifted comments Possible Contamination and/or Chemical Hazards 7. Chain of Custody (Optional) Relinquished by Received by Relinquished by						
Received by	** 1. mg/sample 2. mg/n Comments	n ³ 3, ppm 4. % 5	ype; Impinger s (other) F	olution; Bulk samp lease indicate one	e; Blood; Unite; 1 issue; Son; Water; Other or more units in the column entitled Units**	
Received by Received by Received by Received by Relinquished by Relinquished by Relinquished by Relinquished by Relinquished by Relinquished by	7. Chain of Custody (Op				Detation 3/27/06 13:	07
Received by Pull Pull Pull Pull Pull Pull Pull Pul	Relinquished by	frank 1	and .	100 1011	3/20/4 /270	
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Relinquished by Date/Time	•				Date/Time	
Retinquished by					Date/Time	
	Relinquished by Received by					

	Industri	ial Hygiene Sampli	ng Data						
Ilmmack	k Corporation	Project Nr.:		0704					
1379 Park W	Vestern Drive, PMB 282	Client Name: PK	METAL						
	n Pedro, CA 90732-2217 10) 377-2367 Project Location: 2 448 E . 25 th ST								
Collected by:		Signature: O musto v	. Unmack	ID: 3-27-06					
Suspected Contaminants									
Exposure Controls:		\mathcal{C}							
Employee Name	(1) COMPAC 1025	(2) COMPAC 1025	(3) COMPACIOUS	(4) COMPAC 1025					
or Sample Location	PCS - Wave Solds	c PCS wore Solder	Pcs ware solds	PCS wore Sold					
Field Sample Nr.	PK-1	PK-24	PK-2	PK-3					
Bulk Sample Nr.	PIX 2766	P1×2767/08		P1 x 2769					
Sample Date	3-27-06	3-27-06	3-27-06	3-27-06					
Collection Media	PVC # 45678	CT	PVC+ 45803	PVC# 45795					
Pump or Monitor Nr.	500-303	648228		638561					
Run Time: Start	0842	0859	0903	0915					
Run Time: Stop	1022	0940	1059	1059					
Sample Time (minutes)	100	41	116	104					
Avg. flow rate (L/min)	4. & Hair	0.25	5.0	5.0					
Total volume (liters)	480	10.25	580	520					
Weather Data									
Comments:									
Comments,									
		CARBOXY	TOTAL	TOTAL					
	WEIGHT GAIN	ALKANES		WEIGHT GAIN					
Sample	WEIGHT GAIN								
Analysis Requested		TOTAL HYDROCAR	ane						
-		AS N-HEXANE							
		<u>,</u>							
Relinquished by	Signature	Company Name	3 - 2 7 - 0 6	Time					
JAMES L. UNMACK	James L. Unmark	UNMACK		13:07					
Received by	Signature	Company Name	Date	Time					
		•							
Received by	Signature	Company Name	Date	Time					
Received by	Signature	Company Name	Date	Time					

Industrial Hygiene Sampling Data				
Unmack Corporation 1379 Park Western Drive, PMB 282 San Pedro, CA 90732-2217 (310) 377-2367		Project Nr.:		0704
		Client Name: PK METAL		
		Project Location: 2448 E. 25th ST		
Collected by:		Signature: Jaula L.	Unusch	ID: 3 - 27 - 06
Suspected Contaminants:				
Exposure Controls:				
Employee Name or Sample Location	(1) COMPAC 1025 PCS - Wone Sld	(2) COMPACIONS LPG roungolde	(3)	(4)
Field Sample Nr.	PK-5			
Bulk Sample Nr.	PIX 2770			
Sample Date	3-27-06	3-27-06		
Collection Media	CT	CT		
Pump or Monitor Nr.	648215	648219		
Run Time: Start	0934	0934		
Run Time: Stop	1014	1014		
Sample Time (minutes)	40	40		
Avg. flow rate (L/min)	0.25	0.25		
Total volume (liters)	10	10		
Weather Data				
Comments:				
	VOC	Voc		
	BYGC/MG	BY GC/MS		
Sample Analysis	and the second s			
Requested				
Relinquished by	Signature	Company Name	Date	Time
, , ,	& Dend I Unant	7	3-27-06	13:07
Received by	Signature	Company Name	Date	Time
Received by	Signature	Company Name	Date	Time
Received by	Signature	Company Name	Date	Time

Attachment 4

Photographs



3/27/2006 MS2 on solder bath of wave solder machine



3/27/2006 Samplers over wave solder machine



3/27/2006 Samplers over wave solder bath



Samplers over wave solder machine



3/27/2006 Arrangement of samplers over wave solder machine



3/27/2006 Speedline wave solder machine