

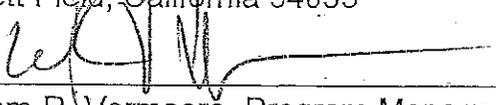
To: David King, COTR

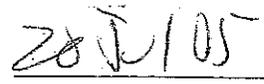
5

AUG 16 2005

NASA Ames Research Center
Moffett Field, California 94035

From:


William R. Vermeere, Program Manager


Date

Contract No.: NAS2-99085

Report Title: N218 Wind Tunnel Survey of Coatings

Keywords: Cadmium, Chromium, Lead, Zinc

Task Number: N/A

Locations: N218, (Wind tunnel Rheostat building, Motorhouse 1st and 2nd floors)

NASA Contact: Stanleigh Phillips 

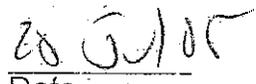
Investigator: Ramsey Razik

Field Date: 06/20/05

Final Report: 00/00/00

Reviewed By:


William Vermeere


Date

Distribution: PAI Project File

Peter Goldsmith, 213-8, PFE
David King, 218-1, QH
John Steen, 218-1, QH
Dan Winningham, 218-1, QE

"From the Ames Safety Office"

Purpose:

This investigation details the heavy metals present in the 14-foot wind tunnel located at N218. The scope of the project is to remove the wind tunnel and ancillary buildings associated with the wind tunnel. The heavy metals of concern are coatings on the metals structures that will be removed. This survey specifically looked at Cadmium, hexavalent Chromium, Lead, and Zinc.

Background:

The 14-foot wind tunnel complex is a total of seven buildings and a large circular wind tunnel that has a fourteen-foot test section located within N218. On June 20th, 2005, the wind tunnel, the motor house and the rheostat building were surveyed to determine which materials should be sampled. From the survey it was decided that the wind tunnels exterior paint, the motor house and the rheostat buildings should all be sampled.

The Occupational Safety and Health Administration have set specific permissible exposure limits (PEL) for the metals sampled for this investigation. Table 1 - OSHA Exposure Limits indicates the action level at which a regulation requires an employer to take protective measures, the permissible exposure limits for these metals expressed as an 8 hour time weighted average and a short term exposure limit (STEL) if applicable.

Table 1 - OSHA Exposure Limits

Material	Action Level	8 hour TWA	STEL
Cadmium	0.25 $\mu\text{g}/\text{m}^3$	0.50 $\mu\text{g}/\text{m}^3$	
Hexavalent Chromium	0.25 $\mu\text{g}/\text{m}^3$	0.50 $\mu\text{g}/\text{m}^3$	10 mg/m^3
Lead	30 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$	
Zinc		15 mg/m^3	

Method:

Bulk samples of the coatings were collected using a hand scraper. Samples were collected in a sealable-labeled plastic bag. All samples were submitted to MACS Lab an AIHA accredited laboratory NVLAP # 11172. Samples were analyzed for cadmium, hexavalent chromium, lead and zinc by atomic adsorption.

Table 2 Materials Tested for this Investigation

Building	Location	Material
N218 D	Motor house 1 st floor	Radiator
N218 D	Motor house 1 st floor	Radiator frame
N218 D	Motor house 1 st floor	Support beams
N218 D	Motor house 2 nd floor	Exterior siding
N218 D	Motor house 2 nd floor	Exterior siding frame
N218 D	Motor house 2 nd floor	Motor covering
Rheostat building	East Side	Exterior siding
Rheostat building	Interior	Exterior siding frame
Rheostat building	Interior tank #6	Tank coating

Building	Location	Material
N218 D	Motor house	External metal paneling
N218 D	Motor house	Support beam structure
N218 D	Motor house	Motor covering
N218 Wind tunnel	West side of 218	Paneling
N218 Wind tunnel	West side of 218	Support beam
N218 Wind Tunnel	Motor house	Paneling

Results:

All painted surfaces tested had a combination of metals in their coatings. The laboratory results are summarized in Table 2 - N218 Wind Tunnel Coating Analysis Summary. The laboratory results are reported in parts per million metal. These results indicate that hexavalent chromium, lead and zinc are present in the coatings

Table 3- N218 Wind Tunnel Coating Analysis Summary
Results reported in parts per million (PPM)

Sample #	Location	Material	Lead	Cadmium	Cr ⁺⁶	Zinc
062505218-01	Motor house 1 st floor	Radiator side	445,000	<126	<126	639
062505218-02	Motor house 1 st floor	Radiator frame	370,000	<165	3,610	8,890
062505218-03	Motor house 1 st floor	Support beams	513,000	<196	<196	560
062505218-04	Rheostat Room	East Exterior siding	2,200	<173	4,510	9,680
062505218-05	Rheostat Room	Exterior siding frame	1470	<108	12,300	19,600
062505218-06	Rheostat Room	Tank coating #6	285	<146	453	1,110
062505218-07	Motor house	External metal paneling	8,620	<167	5,600	14,200
062505218-08	Motor house	Support beam structure	1,340	<198	10,900	19,800
062505218-09	Motor house	Motor covering	2,700	<157	180	1,290
062005218-01	West side of 218	Paneling	182,000	<108	34,800	18,000
062005218-02	West side of 218	Support beam	3,110	<109	40,200	61,100
062005218-03	Motor house	Paneling	110,000	<110	14,200	4,740

Conclusion:

The painted surfaces at the 14- Foot wind tunnel complex contain hazardous materials. All coatings tested were found to contain Lead, and Zinc, and all surfaces except for the radiator sides and the radiator support beams contain hexavalent Chromium in the coating matrix. The levels of Cadmium found in the coatings were below the detection limit and should not be considered a part of the coating matrix.

Recommendations

The steel structures tested for this investigation were found to have chromium, lead and zinc. The Occupational Safety and Health Administration have set exposure limits for these metals. When the wind tunnel is demolished the applicable OSHA regulations governing each of these metals must be adhered to. The OSHA lead standard 29 CFR 1926.62 deals with the demolition of materials containing or coated with Lead. This standard applies to all activities involving metal coatings for this project.

Prior to beginning demolition of the wind tunnel exposure assessments must be completed to determine if the proposed work procedures will generate hexavalent chromium, lead and/or zinc particulates into the breathing zone at or above the concentrations listed in Table 1.

REFERENCES

NASA Ames Health and Safety Plan, Chapter 35, Lead Management Plan

NASA Ames Health and Safety Plan, Chapter 30, Asbestos Management Plan

NIOSH Manual of Analytical Methods (NMAM®), 4th ed., DHHS (NIOSH) Publication 94-113 (August 1994), Cassinelli, M.E. & O'Connor, P.F. (pfo1@cdc.gov), Eds.

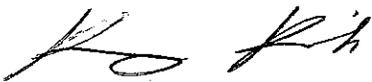
OSHA Technical Manual, Directive no. TED 1-0 15A, Occupational Safety and Health Administration (January, 1999).

Federal Regulations (Standards - 29 CFR) TABLE Z-1 Limits for Air Contaminants. - 1910.1000 TABLE Z-1

29 CFR 1910.1000, 1910.1001, 29 CFR 1926.1101, and 29 CFR 1910.1025 U.S. Occupational Safety and Health Administration.

If you have any questions, please do not hesitate to contact me at extension 4 6946.

Sincerely,



Ramsey Razik
PAI, Sr. Industrial Hygienist

Att:

MACS Lab, Inc.
 1505 Wyatt Dr
 Santa Clara, CA 95054-1586

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 JUL 06 2005

**Analysis Report
 Chromium in Paint**

(408) 727-9727

PAI Corporation
 NASA Ames Research Center
 Mail Station 221-10
 Moffett Field C A 94035-1000

Person to contact: Ramsey Razik
 Contact phone: 650-814-7958
 FAX phone: 650-604-2034
 Samples received on: June 29, 2005
 Samples analyzed on: June 29, 2005 at: 13:24
 Report printed on: June 29, 2005 at: 13:24
 Corresponding invoice number: 144055

Purchase Order Number: 20374

Analyst: Duy Nguyen
 DN (signature)

Laboratory manager: A. D Sime
 (signature)

Job Description: *** TEST FOR CHROMIUM *** - N218 Wind Tunnel Demolition Project - NASA-Ames

Lab Sample Number	Client Sample Number and Description	Calib #	Rcvd OK	Ac-cptd	Report'g Limit ppm	%	Chromium ppm	mg/cm ²
P144055-1	062505218-01 Wind tunnel radiator side	10008	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	130	< 0.013	< 126	N/A
P144055-2	062505218-02 Wind tunnel Room support beam	10008	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	660	0.361	3,610	N/A
P144055-3	062505218-03 Wind tunnel Room support beam	10008	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	200	< 0.020	< 196	N/A
P144055-4	062505218-04 Reostat Room metal siding	10008	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	690	0.451	4,510	N/A
P144055-5	062505218-05 Reostat Room metal support beam	10008	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1,500	1.23	12,300	N/A
P144055-6	062505218-06 Reostat Room saline holding tank	10008	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	150	0.045	453	N/A
P144055-7	062505218-07 Motor house exterior support beam	10008	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1,000	0.560	5,600	N/A
P144055-8	062505218-08 Motor house exterior siding	10008	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2,000	1.09	10,900	N/A
P144055-9	062505218-09 Motor house motor casing	10008	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	160	0.018	180	N/A

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 1505 Wyatt Dr
 Santa Clara, CA 95054-1586

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Analysis Report
Lead in Paint
USEPA 7000/7420

(408) 727-9727

PAI Corporation
 NASA Ames Research Center
 Mail Station 221-10
 Moffett Field CA 94035-1000

Person to contact: Ramsey Razik
 Contact phone: 650-814-7958
 FAX phone: 650-604-2034
 Samples received on: June 29, 2005
 Samples analyzed on: June 29, 2005 at: 13:06
 Report printed on: June 29, 2005 at: 13:06
 Corresponding invoice number: 144052

Purchase Order Number: 20374

Bias: 3.2%

Precision: -1.4% A D Sime

Analyst: Duy Nguyen
 DN (signature)

Laboratory manager: A D Sime
 (signature)

Job Description: N218 Win Tunnel Demolition Project - NASA-Ames

Lab Sample Number	Client Sample Number and Description	Calib #	Rcvd OK	Ac-cptd	Report'g Limit ppm	%	Lead ppm	mg/cm ²
P144052-1	062505218-01 Wind tunnel radiator side	10006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10,000	44.5	445,000	N/A
P144052-2	062505218-02 Wind tunnel radiator Room support beam	10006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	13,000	37.0	370,000	N/A
P144052-3	062505218-03 Wind tunnel radiator Room support beam	10006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	16,000	51.3	513,000	N/A
P144052-4	062505218-04 Reostat Room metal siding	10006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	170	0.220	2,200	N/A
P144052-5	062505218-05 Reostat Room metal support beam	10006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	110	0.147	1,470	N/A
P144052-6	062505218-06 Reostat Room saline holding tank	10006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	150	0.029	285	N/A
P144052-7	062505218-07 Motor house exterior support beam	10006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	170	0.862	8,620	N/A
P144052-8	062505218-08 Motor house exterior siding	10006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	200	0.134	1,340	N/A
P144052-9	062505218-09 Motor house motor casing	10006	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	160	0.270	2,700	N/A

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Calibration # AA-10006

Element Lead	Matrix: Paint	Method Detection Limit 0.25 µg/ml	
Date of Analysis June 29, 2005		Analyst DN	
	Measured Value	Target Value	Acceptance Criterion
Standard value	0.0 µg/ml	0.00000 units	N/A
Standard value	0.8 µg/ml	0.01600 units	N/A
Standard value	2.0 µg/ml	0.04100 units	N/A
Standard value	5.0 µg/ml	0.10060 units	N/A
Standard value	10.0 µg/ml	0.19390 units	N/A
	Slope	51.5336 µg/ml/unit	N/A
	Intercept	-0.062811 µg/ml	N/A
	Correlation coefficient	0.999791	≥ 0.99800 Acceptable
	0.25 µg/ml Reference	0.252 µg/ml	0.25 ≥ 0.06 Acceptable
	Glassware rinse water	< 0.250 µg/ml	0
	1st Matrix Blank	< 0.250 µg/ml	0 ≤ 0.25 Acceptable
	Method Blank Beginning	-2.368 µg	0 ≤ 12.5 Acceptable
	CCV Beginning	5.044 µg/ml	5.0000 ± 10.0% Acceptable
	ICV Beginning	0.581 µg/ml	0.6000 ± 10.0% Acceptable
	LCS Before sample 1	10.496 µg/ml	10.6893 ± 10.0% Acceptable
	CCV Before sample 11	N/A µg/ml	5.0000 ± 10.0%
	CCB Before sample 11	N/A µg/ml	0 ≤ 0.25
	Method Blank Before sample 11	N/A µg	0 ≤ 12.5
	CCV Before sample 21	N/A µg/ml	5.0000 ± 10.0%
	CCB Before sample 21	N/A µg/ml	0 ≤ 0.25
	2nd Matrix Blank	N/A µg/ml	0 ≤ 0.25
	Method Blank Before sample 21	N/A µg	0 ≤ 12.5
	CCV Before sample 31	N/A µg/ml	5.0000 ± 10.0%
	CCB Before sample 31	N/A µg/ml	0 ≤ 0.25
	Method Blank Before sample 31	N/A µg	0 ≤ 12.5
	CCV After	5.085 µg/ml	5.0000 ± 10.0% Acceptable
	CCB After	< 0.250 µg/ml	0 ≤ 0.25 Acceptable
	Method Blank After	-4.944 µg	0 ≤ 12.5 Acceptable
	LCS After	10.373 µg/ml	10.6893 ± 10.0% Acceptable
	RLVS	0.252 µg/ml	0.2500 ± 25.0% Acceptable
	Spike of sample 143967 -	1 495.8 µg	500.0 ± 25.0% Acceptable
	Spike of sample 0 -	0 N/A µg	0.0 ± 25.0%
	Spiked Duplicate 143967 -	1 497.0 µg	500.0 ± 25.0% Acceptable
	Spiked Duplicate 0 -	0 N/A µg	0.0 ± 25.0%
	Duplicate of sample 143967	1 ≤ 94 ppm	≤ 94 ± 25.0% Acceptable
	Duplicate of sample 0 -	0 N/A ppm	± 25.0%

Note:
 MDL= Minimum Detection Limit of the method (absolute)
 ICV= Initial Calibration Verification
 CCV= Continuing Calibration Verification
 CCB= Continuing Calibration Blank
 N/A = Not Applicable
 LCS= Laboratory Control Sample - NIST SRM-1579
 RLVS=Reporting Limit Verification Sample

Duplicate analyses are measurements of the variable of interest (in this case lead) performed identically on two subsamples of the same sample. The results from duplicate analyses are used to evaluate analytical or measurement precision but not the precision of sampling. Spiked samples are prepared by adding a known mass of the target analyte (in this case lead) to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Spiked samples are used to determine the effect of the matrix on a method's recovery efficiency. The Method Blank is used to detect contamination from the laboratory. Accuracy is the degree of agreement between an observed value and an accepted reference value such as the LCS NIST SRM-1579 sample. Precision is the degree to which a set of observations or measurements of the same property conform to themselves. NEVER depend upon the laboratory to "fix-up" a poorly taken sample.

MACS Lab, Inc.
 1505 Wyatt Dr
 Santa Clara, CA 95054-1586

(408) 727-9727

Client:
 PAI Corporation

Submission ID Number: **144052**

AA Analysis Data Report

NOTICE:

Instrument reading is in absorbance units
 For solids (paint and soil):

Weight is in grams
 Paint area (if present) is in sq cm

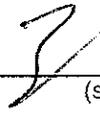
For air:

LPM= Liters per minute supplied by client
 Minutes = duration of sample
 m^3 (on report) means cubic meter

For wipe:

Area = Wipe area supplied by client in sq ft
 ft^2 (on report) means square foot

Lead laboratory manager
 or designee:



 (signature)

Samples received on: June 29, 2005

Samples analyzed on: June 29, 2005

at: 13:06

I verify that I have checked the records and the data entered here is accurate and matches the written records

Sample #	Weight, LPM, or area	Solution vol ml	Instr. reading	Paint area or minutes
1	0.0991	4000	0.21520	0
2	0.0756	4000	0.13700	0
3	0.0637	4000	0.15990	0
4	0.0723	50	0.06290	0
5	0.1162	50	0.06750	0
6	0.0857	50	0.01070	0
7	0.0749	50	0.25180	0
8	0.0632	50	0.03410	0
9	0.0798	50	0.08490	0

End of report

This report shows the data associated with the individual samples. This includes the MACS Lab, Inc. sample number, the sample weight digested, LPM, area wiped, dilution (solution volume), instrument reading in absorbance, paint area, time in minutes. By using the data on this page, and the slope and intercept found on the calibration curve page of this report one can calculate the concentration of analyte in the original sample. Be sure to use the calibration curve data for the sample tested (see sample results page for Calib. Number). In the case of paint and soil matrices multiply the slope times the absorbance and add the intercept. Multiply this number by the dilution and then divide by the weight. The result will be expressed in PPM. In the case of dust samples multiply the slope times the absorbance and add the intercept. Multiply this number times the dilution and adjust for the area wiped if it is not 1 sq ft. For air samples multiply the slope times the absorbance and add the intercept. Multiply this number by the dilution. This will be the number of μg of lead on the filter. Divide this number by the liters of air used and compute the concentration in cubic meters. A cubic meter contains 1000 liters. Note: in all cases if the concentration calculated by multiplying the slope times the absorbance and adding the intercept is below the MDL (method detection limit) value for that matrix substitute the MDL for the value calculated. This will be the Reporting Limit in PPM. (note: the MDL is shown only to 2 significant figures on this report which will result in slight differences between our and your calculations for this number).

The slope and intercept can be calculated using the absorbance and concentration (see the Quality Control Report) of the standards used in the analysis. This can be done by using linear regression analysis.

P144052
P144055
P144053
P144056

MACS LAB INC.
155A Warr Road
Santa Clara, CA 95050

Submitting Co. **PAI CORP.**
Mail Stop 221-10
NASA Ames Research Center
Moffett Field CA 94035
fax # 650.604.2034

Project Name: N218 Wind tunnel demolition project
Project Location: NASA-Ames
Project Number:
Purchase Order No.

Special Instructions (include requests for special reporting or data packages)
PLEASE EMAIL RESULTS TO: rrazik@mail.arc.nasa.gov
In PDF Format

Sample Type (Select One)
All samples on form should be of SAME matrix type. Use additional forms as needed.

Matrix Type (Select One)

Sample Type (Select One)

Analysis Method (Select All That Apply)

Matrix-Total Count

RCRA Metals

Trace Metals

Organics

Asbestos

Other

Notes: All samples for organics should be kept at 4°C from collection until testing. Schedule rush analyses in advance. Indicate preservatives added & media type. Indicate analysis method for organics tests.

Sample ID	Sample Description	Matrix	Analysis Method	RCRA Metals	Trace Metals	Organics	Asbestos	Other
062505218-01	wind tunnel radiator side	Solid	TCM (NIOSH 7400)	X	X	X	X	X
062505218-02	wind tunnel radiator room support beam	Solid	TCM (NIOSH 7400)	X	X	X	X	X
062505218-03	wind tunnel radiator room support beam	Solid	TCM (NIOSH 7400)	X	X	X	X	X
062505218-04	recostat room metal siding	Solid	TCM (NIOSH 7400)	X	X	X	X	X
062505218-05	recostat room metal support beam	Solid	TCM (NIOSH 7400)	X	X	X	X	X
062505218-06	recostat room ceiling holding tank	Solid	TCM (NIOSH 7400)	X	X	X	X	X
062505218-07	Motor house exterior siding	Solid	TCM (NIOSH 7400)	X	X	X	X	X
062505218-08	Motor house motor casing	Solid	TCM (NIOSH 7400)	X	X	X	X	X
062505218-09	Motor house exterior siding	Solid	TCM (NIOSH 7400)	X	X	X	X	X

Sampled by: (NAME) Ramsey Razik

Relinquished by (NAME) Ramsey Razik

Received by (NAME) Robin Campbell (SIGNATURE) DATE/TIME 6/29/05 08:20

() JAB () JUPS () JUSM () JCL () JHD () JDB ()

Unusual Sample Condition Noted:

State where samples were collected: CA

() Sample return requested

() Ambient temp () Cool () IR () IS

Waybill#

DIFFUSIONS PRINTED ON THE BACK OF THIS FORM.

MACS Lab, Inc.
 1505 Wyatt Dr
 Santa Clara, CA 95054-1586

**Analysis Report
 Cadmium in Paint**

(408) 727-9727

PAI Corporation
 NASA Ames Research Center
 Mail Station 221-10
 Moffett Field CA 94035-1000

Person to contact: Ramsey Razik
 Contact phone: 650-814-7958
 FAX phone: 650-604-2034
 Samples received on: June 29, 2005
 Samples analyzed on: June 29, 2005 at: 14:00
 Report printed on: June 29, 2005 at: 14:00
 Corresponding invoice number: 144056

Purchase Order Number: 20374

Duy Nguyen

A. D. Sime

Analyst: DN (signature)

Laboratory manager: A. D. Sime (signature)

Job Description: *** TEST FOR CADMIUM *** - N218 Wind Tunnel Demolition Project -
 NASA-Ames

Lab Sample Number	Client Sample Number and Description	Calib #	Rcvd OK	Ac-cptd	Report'g Limit ppm	%	Cadmium ppm	mg/cm ²
P144056-1	062505218-01 Wind tunnel radiator side	10009	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	130	< 0.013	< 126	N/A
P144056-2	062505218-02 Wind tunnel radiator Room support beam	10009	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	170	< 0.017	< 165	N/A
P144056-3	062505218-03 Wind tunnel radiator Room support beam	10009	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	200	< 0.020	< 196	N/A
P144056-4	062505218-04 Reostat Room metal siding	10009	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	170	< 0.017	< 173	N/A
P144056-5	062505218-05 Reostat Room emtal support beam	10009	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	110	< 0.011	< 108	N/A
P144056-6	062505218-06 Reostat Room saline holding tank	10009	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	150	< 0.015	< 146	N/A
P144056-7	062505218-07 Motor house exterior support beam	10009	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	170	< 0.017	< 167	N/A
P144056-8	062505218-08 Motor house exterior siding	10009	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	200	< 0.020	< 198	N/A

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MACS Lab, Inc.

Analysis Report

Lab Sample Number	Client Sample Number and Description	Calib #	Rcvd OK	Ac-cptd	Report'g Limit ppm	Cadmium		
						%	ppm	mg/cm ²
P144056-9	062505218-09 Motor house motor casing	10009	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	160	< 0.016	< 157	N/A

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MACS Lab, Inc.
 1505 Wyatt Dr
 Santa Clara, CA 95054-1586

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Analysis Report
Zinc in Paint

(408) 727-9727

PAI Corporation
 NASA Ames Research Center
 Mail Station 221-10
 Moffett Field C A 94035-1000

Person to contact: Ramsey Razik
 Contact phone: 650-814-7958
 FAX phone: 650-604-2034
 Samples received on: June 29, 2005
 Samples analyzed on: June 29, 2005 at: 13:16
 Report printed on: June 29, 2005 at: 13:16
 Corresponding invoice number: 144053

Purchase Order Number: 20374

Analyst: Duy Nguyen
 DN (signature)

Laboratory manager: A. D. Sime
 (signature)

Job Description: *** TEST FOR ZINC *** - N218 Wind Tunnel Demolition Project - NASA-Ames

Lab Sample Number	Client Sample Number and Description	Calib #	Rcvd OK	Ac-cptd	Report'g Limit ppm	%	Zinc ppm	mg/cm ²
P144053-1	062505218-01 Wind tunnel radiator side	10007	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	130	0.064	639	N/A
P144053-2	062505218-02 Wind tunnel radiator Room support beam	10007	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	990	0.889	8,890	N/A
P144053-3	062505218-03 Wind tunnel radiator Room support beam	10007	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	200	0.056	560	N/A
P144053-4	062505218-04 Reostat Room metal siding	10007	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1,000	0.968	9,680	N/A
P144053-5	062505218-05 Reostat Room metal support beam	10007	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2,200	1.96	19,600	N/A
P144053-6	062505218-06 Reostat Room saline holding tank	10007	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	150	0.111	1,110	N/A
P144053-7	062505218-07 Motor house exterior support beam	10007	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1,700	1.42	14,200	N/A
P144053-8	062505218-08 Motor house exterior siding	10007	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2,000	1.98	19,800	N/A
P144053-9	062505218-09 Motor house casing	10007	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	160	0.129	1,290	N/A

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Analysis Report
Lead in Paint
USEPA 7000/7420

Person to contact: Ramsey Razik
 Contact phone: 650-814-7958
 FAX phone: 650-604-2034
 Samples received on: June 22, 2005
 Samples analyzed on: June 23, 2005 at: 10:28
 Report printed on: June 23, 2005 at: 10:28
 Corresponding invoice number: 143803

PAI Corporation
 NASA Ames Research Center
 Mail Station 221-10
 Moffett Field CA 94035-1000

Bias: 3.2%

Precision: -1.4%

A. D. Sime

Analyst: Duy Nguyen
 DN (signature)

Laboratory manager: A. D. Sime
 (signature)

Job Description: N218 Wind Tunnel demolition project - NASA-Ames

Lab Sample Number	Client Sample Number and Description	Calib #	Rcvd OK	Ac-cptd	Report'g Limit ppm	%	Lead ppm	mg/cm ²
P143803-1	06205218-01 Paint sample analyze for Pb.	9990	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	11,000	18.2	182,000	N/A
P143803-2	06205218-02 Paint sample analyze for Pb.	9990	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	110	0.311	3,110	N/A
P143803-3	06205218-03 Paint sample analyze for Pb.	9990	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	11,000	21.2	212,000	N/A

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MACS Lab, Inc.

1505 Wyatt Dr
Santa Clara, CA 95054-1586

Quality Control Report

Calibration # AA-9990

Element Lead	Matrix: Paint	Method Detection Limit	0.25 µg/ml
Date of Analysis June 23, 2005	Analyst DN		
	Measured Value	Target Value	Acceptance Criterion
Standard value	0.0 µg/ml	0.00000 units	N/A
Standard value	0.8 µg/ml	0.01560 units	N/A
Standard value	2.0 µg/ml	0.04180 units	N/A
Standard value	5.0 µg/ml	0.09960 units	N/A
Standard value	10.0 µg/ml	0.19380 units	N/A
	Slope	51.6244 µg/ml/unit	N/A
	Intercept	-0.061970 µg/ml	N/A
	Correlation coefficient	0.999805	1 ≥ 0.99800 Acceptable
0.25 µg/ml Reference	0.165 µg/ml	0.25	≥0.06 Acceptable
Glassware rinse water	< 0.250 µg/ml	0	
1st Matrix Blank	< 0.250 µg/ml	0	≤ 0.25 Acceptable
Method Blank Beginning	-2.324 µg	0	≤ 12.5 Acceptable
CCV Beginning	5.095 µg/ml	5.0000	± 10.0% Acceptable
ICV Beginning	0.542 µg/ml	0.6000	± 10.0% Acceptable
LCS Before sample 1	10.888 µg/ml	10.6493	± 10.0% Acceptable
CCV Before sample 11	N/A µg/ml	5.0000	± 10.0%
CCB Before sample 11	N/A µg/ml	0	≤ 0.25
Method Blank Before sample 11	N/A µg	0	≤ 12.5
CCV Before sample 21	N/A µg/ml	5.0000	± 10.0%
CCB Before sample 21	N/A µg/ml	0	≤ 0.25
2nd Matrix Blank	N/A µg/ml	0	≤ 0.25
Method Blank Before sample 21	N/A µg	0	≤ 12.5
CCV Before sample 31	N/A µg/ml	5.0000	± 10.0%
CCB Before sample 31	N/A µg/ml	0	≤ 0.25
Method Blank Before sample 31	N/A µg	0	≤ 12.5
	CCV After	5.044 µg/ml	5.0000 ± 10.0% Acceptable
	CCB After	< 0.250 µg/ml	0 ≤ 0.25 Acceptable
	Method Blank After	-3.357 µg	0 ≤ 12.5 Acceptable
	LCS After	10.913 µg/ml	10.6493 ± 10.0% Acceptable
	RLVS	0.196 µg/ml	0.2500 ± 25.0% Acceptable
Spike of sample	143700 - 14	477.9 µg	500.0 ± 25.0% Acceptable
Spike of sample	0 - 0	N/A µg	0.0 ± 25.0%
Spiked Duplicate	143700 - 14	479.3 µg	500.0 ± 25.0% Acceptable
Spiked Duplicate	0 - 0	N/A µg	0.0 ± 25.0%
Duplicate of sample	143700 14	≤ 103 ppm	≤ 106 ± 25.0% Acceptable
Duplicate of sample	0 - 0	N/A ppm	± 25.0%

Note:
MDL= Minimum Detection Limit of the method (absolute)
ICV= Initial Calibration Verification
CCV= Continuing Calibration Verification
CCB= Continuing Calibration Blank
N/A = Not Applicable
LCS= Laboratory Control Sample - NIST SRM-1579
RLVS=Reporting Limit Verification
Sample
Page 2 of 2

Duplicate analyses are measurements of the variable of interest (in this case lead) performed identically on two subsamples of the same sample. The results from duplicate analyses are used to evaluate analytical or measurement precision but not the precision of sampling. Spiked samples are prepared by adding a known mass of the target analyte (in this case lead) to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Spiked samples are used to determine the effect of the matrix on a method's recovery efficiency. The Method Blank is used to detect contamination from the laboratory. Accuracy is the degree of agreement between an observed value and an accepted reference value such as the LCS NIST SRM-1579 sample. Precision is the degree to which a set of observations or measurements of the same property conform to themselves. NEVER depend upon the laboratory to "fix-up" a poorly taken sample.

MACS Lab, Inc.
 1505 Wyatt Dr
 Santa Clara, CA 95054-1586

(408) 727-9727

AA Analysis Data Report

NOTICE:
 Instrument reading is in absorbance units
 For solids (paint and soil):
 Weight is in grams
 Paint area (if present) is in sq cm
 For air:
 LPM= Liters per minute supplied by client
 Minutes = duration of sample
 m³ (on report) means cubic meter
 For wipe:
 Area = Wipe area supplied by client in sq ft
 ft² (on report) means square foot

Client:
 PAI Corporation
 Submission ID Number: **143803**

Lead laboratory manager
 or designee:



 (signature)

Samples received on: June 22, 2005

Samples analyzed on: June 23, 2005

at: 10:28

I verify that I have checked the records and the data entered here is accurate and matches the written records.

Sample #	Weight, LPM, or area	Solution vol ml	Instr. reading	Paint area or minutes
1	0.1159	5000	0.08270	0
2	0.1145	50	0.13920	0
3	0.1141	5000	0.09490	0

End of report

This report shows the data associated with the individual samples. This includes the MACS Lab, Inc. sample number, the sample weight digested, LPM, area wiped, dilution (solution volume), instrument reading in absorbance, paint area, time in minutes. By using the data on this page, and the slope and intercept found on the calibration curve page of this report one can calculate the concentration of analyte in the original sample. Be sure to use the calibration curve data for the sample tested (see sample results page for Calib. Number). In the case of paint and soil matrices multiply the slope times the absorbance and add the intercept. Multiply this number by the dilution and then divide by the weight. The result will be expressed in PPM. In the case of dust samples multiply the slope times the absorbance and add the intercept. Multiply this number times the dilution and adjust for the area wiped if it is not 1 sq ft. For air samples multiply the slope times the absorbance and add the intercept. Multiply this number by the dilution. This will be the number of µg of lead on the filter. Divide this number by the liters of air used and compute the concentration in cubic meters. A cubic meter contains 1000 liters. Note: in all cases if the concentration calculated by multiplying the slope times the absorbance and adding the intercept is below the MDL (method detection limit) value for that matrix substitute the MDL for the value calculated. This will be the Reporting Limit in PPM. (note: the MDL is shown only to 2 significant figures on this report which will result in slight differences between our and your calculations for this number).

The slope and intercept can be calculated using the absorbance and concentration (see the Quality Control Report) of the standards used in the analysis. This can be done by using linear regression analysis.

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 Santa Clara, CA 95054-1586

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**Analysis Report
 Chromium in Paint**

(408) 727-9727

Person to contact: Ramsey Razik
 Contact phone: 650-814-7958
 FAX phone: 650-604-2034
 Samples received on: June 22, 2005
 Samples analyzed on: June 23, 2005 at: 10:36
 Report printed on: June 23, 2005 at: 10:36
 Corresponding invoice number: 143818

PAI Corporation
 NASA Ames Research Center
 Mail Station 221-10
 Moffett Field CA 94035-1000

Purchase Order Number: 20374

Duy Nguyen

A. D. Sime

Analyst: DN (signature)

Laboratory manager: AS (signature)

Job Description: N218 Wind tunnel demolition project - NASA-Ames

Lab Sample Number	Client Sample Number and Description	Calib #	Rcvd OK	Ac-cptd	Report'g Limit ppm	%	Chromium ppm	mg/cm ²
P143818-1	062105218-01 Paint sample analyze for Hex Chromium	9991	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	5,400	3.48	34,800	N/A
P143818-2	062105218-02 Paint sample analyze for Hex Chromium	9991	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	5,500	4.02	40,200	N/A
P143818-3	062105218-03 Paint sample analyze for Hex Chromium	9991	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	3,300	1.42	14,200	N/A

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**Analysis Report
 Cadmium in Paint**

(408) 727-9727

Person to contact: Ramsey Razik
 Contact phone: 650-814-7958
 FAX phone: 650-604-2034
 Samples received on: June 22, 2005
 Samples analyzed on: June 23, 2005 at: 10:48
 Report printed on: June 23, 2005 at: 10:48
 Corresponding invoice number: 143816

PAI Corporation
 NASA Ames Research Center
 Mail Station 221-10
 Moffett Field C A 94035-1000

Purchase Order Number: 20374

Duy Nguyen

A. D. Sime

Analyst: _____
DN (signature)

Laboratory manager: _____
(signature)

Job Description: N218 Wind Tunnel demolition project - NASA-Ames

Lab Sample Number	Client Sample Number and Description	Calib #	Rcvd OK	Ac-cptd	Report'g Limit ppm	%	Cadmium ppm	mg/cm ²
P143816-1	062105218-01 Paint sample analyze for Cd.	9992	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	110	< 0.011	< 108	N/A
P143816-2	062105218-02 Paint sample analyze for Cd.	9992	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	110	< 0.011	< 109	N/A
P143816-3	062105218-03 Paint sample analyze for Cd.	9992	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	110	< 0.011	< 110	N/A

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**Analysis Report
 Zinc in Paint**

(408) 727-9727

PAI Corporation
 NASA Ames Research Center
 Mail Station 221-10
 Moffett Field CA 94035-1000

Person to contact: Ramsey Razik
 Contact phone: 650-814-7958
 FAX phone: 650-604-2034
 Samples received on: June 22, 2005
 Samples analyzed on: June 23, 2005 at: 11:03
 Report printed on: June 23, 2005 at: 11:03
 Corresponding invoice number: 143817

Purchase Order Number: 20374

Duy Nguyen

A. D. Sime

Analyst: DN (signature)

Laboratory manager: Asf (signature)

Job Description: N218 Wind tunnel demolition project - NASA-Ames

Lab Sample Number	Client Sample Number and Description	Calib #	Rcvd OK	Ac-cptd	Report'g Limit ppm	%	Zinc ppm	mg/cm ²
P143817-1	062105218-01 Paint sample analyze for Zn.	9993	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	2,200	1.80	18,000	N/A
P143817-2	062105218-02 Paint sample analyze for Zn.	9993	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	6,600	6.11	61,100	N/A
P143817-3	062105218-03 Paint sample analyze for Zn.	9993	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	1,100	0.474	4,740	N/A

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