A Roadmap for Protecting Binational Wastewater Quality

Water and Environment Committees, A Joint Action Item

Guía Para Proteger la Calidad de Aguas Residuales Binacionales

Comités de Agua e Ecología y Medio Ambiente, Una Línea de Acción Conjunta

Arizona-Mexico Commission
2011 AMC Summer Plenary Session
June 3, 2011

Comisión Sonora-Arizona
Sesión Plenaria del Verano, 2011
3 de Junio, 2011

Hans Huth
Senior Hydrologist
Arizona Department of Environmental Quality (ADEQ)
Office of Border Environmental Protection (OBEP)
http://www.azdeq.gov/obep/
huth.hans@azdeq.gov
520-628-6711

ADEQ Arizona Department of Environmental Quality

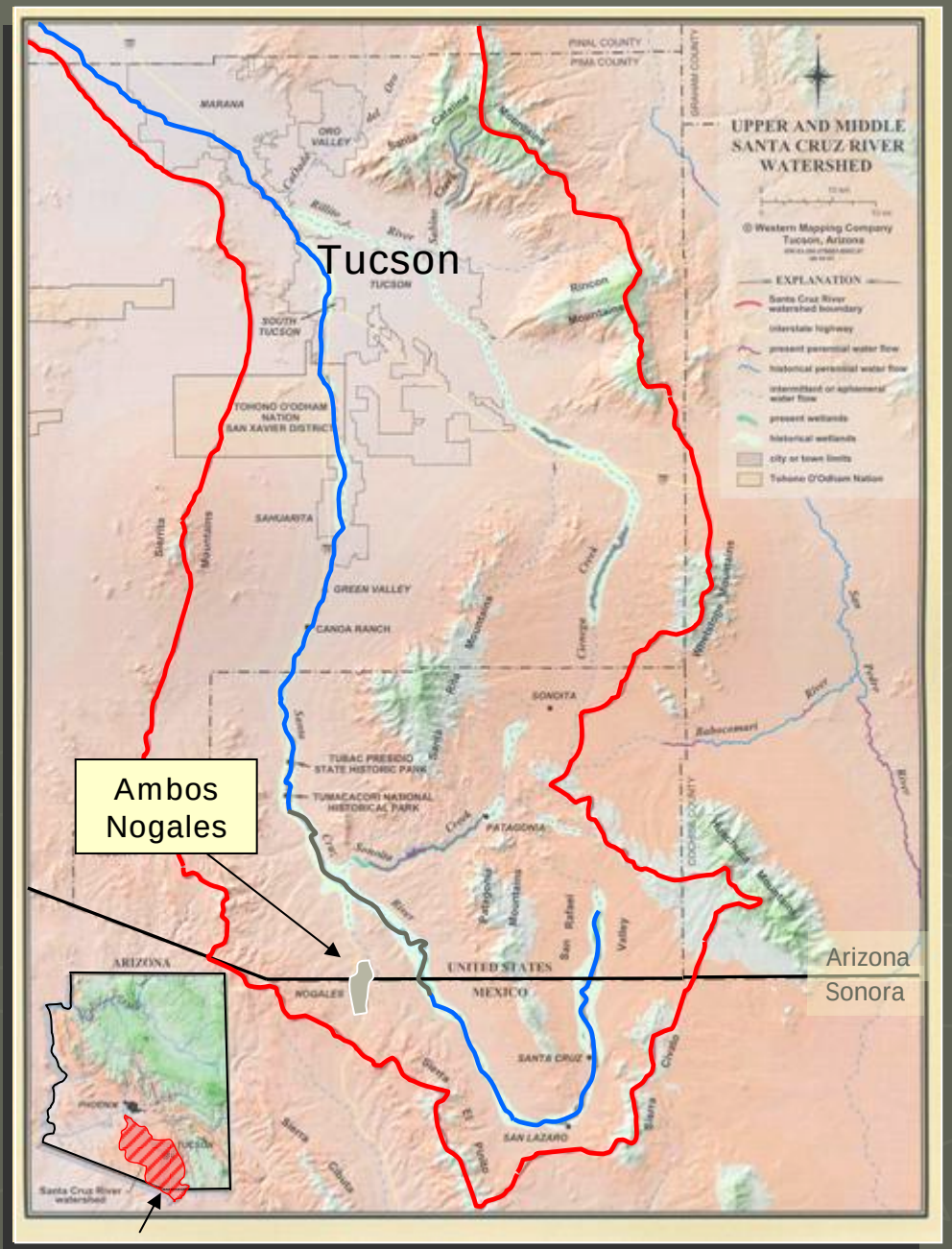
Clarification

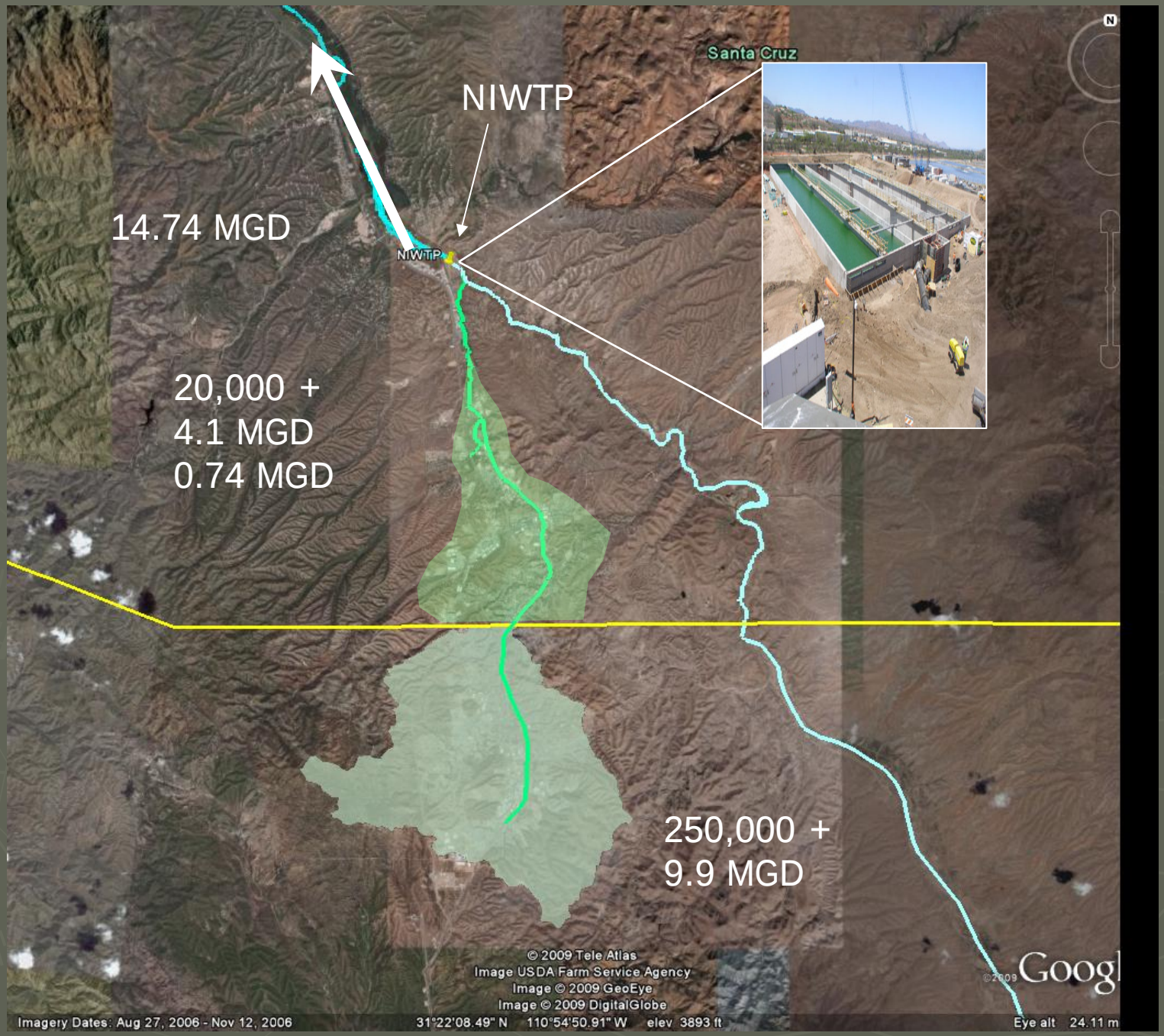
The U.S. International Boundary and Water Commission (IBWC) coordinates with its sister agency in Mexico (CILA) on water quality challenges in binational watersheds.

Requirements to maintain water quality for the protection of binational investments in infrastructure are formalized in a binational treaty between IBWC and CILA (Minute 276) with title "*Conveyance, Treatment and Disposal of Sewage from Nogales, Arizona and Nogales, Sonora Exceeding the Capacities Allotted to the United States and Mexico Under Minute Number 227*."

In matters dealing with binational wastewater quality IBWC/CILA have precedence.

For additional details, please see page 2, last paragraph and page 4, point #6 of the minute available here: http://www.ibwc.gov/Files/Minutes/Min276.pdf .


UPPER AND MIDDLE SANTA CRUZ RIVER WATERSHED
© Western Mapping Company Tucson, Arizona
EXPLANATION
Santa Cruz River watershed boundary
interstate highway
present perennial water flow
historical perennial water flow
intermittent or ephemeral water flow
present wetlands
historical wetlands
city or town limits
Tohono O'Odham Nation
Tucson
TUCSON
MARANA
ORO VALLEY
SOUTH TUCSON
TOHONO O'ODHAM NATION SAN XAVIER DISTRICT
SAHUARITA
GREEN VALLEY
CANOA RANCH
SONOITA
TUBAC PRESIDIO STATE HISTORIC PARK
TUMACACORI NATIONAL HISTORICAL PARK
PATAGONIA
NOGALES
SANTA CRUZ
SAN LAZARO
UNITED STATES
MEXICO
ARIZONA
PINAL COUNTY
PIMA COUNTY
GRAHAM COUNTY
COCHISE COUNTY
Ambos Nogales
Arizona
Sonora
Santa Cruz River watershed


NIWTP
14.74 MGD
NIWTP
Santa Cruz
20,000 +
4.1 MGD
0.74 MGD
250,000 +
9.9 MGD
© 2009 Tele Atlas
Image USDA Farm Service Agency
Image © 2009 GeoEye
Image © 2009 DigitalGlobe
Imagery Dates: Aug 27, 2006 - Nov 12, 2006
31°22'08.49" N 110°54'50.91" W elev 3893 ft
Eye alt 24.11 m

IBWC Notification Regarding Challenges with Metals
Notificación de CILA Sobre la Transmisión de Metales y Cianuro

10/2008 – 9/2009

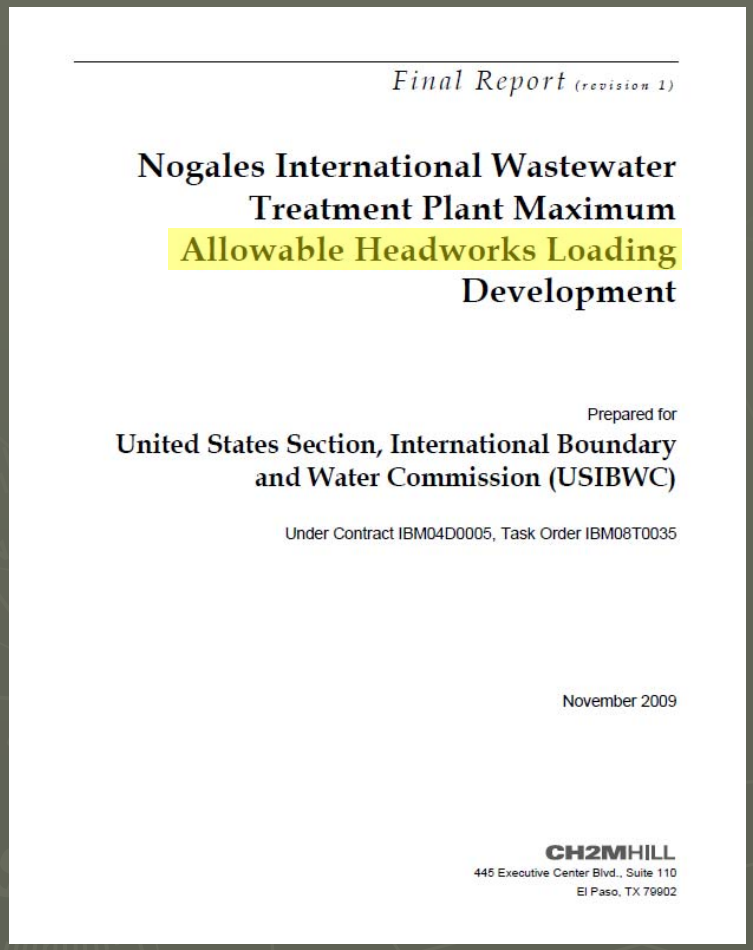
Monitoring Period Periodo de Monitoreo	Date of Notification Día de Notificación	Contaminant Contaminante
10/2008	12/11/2008	Cadmium (effluent)
1/2009	3/6/2009	Cadmium, copper, mercury (effluent)
2/2009	4/13/2009	Cadmium, copper, cyanide (effluent)
3/2009	5/5/09	Cadmium (effluent)
4/2009	6/25/09	Cadmium (effluent)
6/2009	7/29/09	Cadmium (effluent)
8/2009	9/30/09	Cadmium, cyanide (effluent)
9/2009	10/21/09	Cadmium, cyanide (effluent)

243
Santa Cruz
~2 miles downstream of plant discharge
~2 millas aguas abajo de la planta
100238
Santa Cruz River Junction
NIWTP
100571
100246
100251
100239
Image © 2009 DigitalGlobe
Image USDA Farm Service Agency
© 2009 Tele Atlas
©2009 Google
Imagery Dates: Jun 21, 2006 - Nov 12, 2006
31°29'21.46" N 110°56'35.15" W elev 3669 ft
Eye alt 28.10 mi

FOSCR Monitoring Cadmium / Monitoreo de FOSCR Cadmio 7/2007 – 10/2009

Date	Tot. Cd (ug/l)	Dis. Cd (ug/l)	Hardness[a] Ca+Mg (ppm)	Standard (ug/l)	Exceedance
7/31/07	ND	ND	182	0.85	No
10/30/07	ND	ND	170	0.81	No
2/26/08	ND	ND	155	0.76	No
4/30/08	5.6	2.1[+]	157	0.77	Yes
7/29/08	3.3[*]	ND	148	0.74	No
10/28/08	ND	ND	159	0.77	No
1/26/09	4.8	ND	159	0.77	No
4/28/09	2.7	2.5[+]	157	0.77	Yes
7/28/09	3.8	3.5	148	0.74	Yes
10/27/09	9.1	8.3	147	0.73	Yes

Allowable Headworks Loadings (AHL) for Cadmium
Permisibles Lodos de Entrada (AHL) para Cadmio



Final Report (revision 1)

Nogales International Wastewater Treatment Plant Maximum Allowable Headworks Loading Development

Prepared for

United States Section, International Boundary and Water Commission (USIBWC)

Under Contract IBM04D0005, Task Order IBM08T0035

November 2009

CH2MHILL
445 Executive Center Blvd., Suite 110
El Paso, TX 79902

290 kg Cd /day

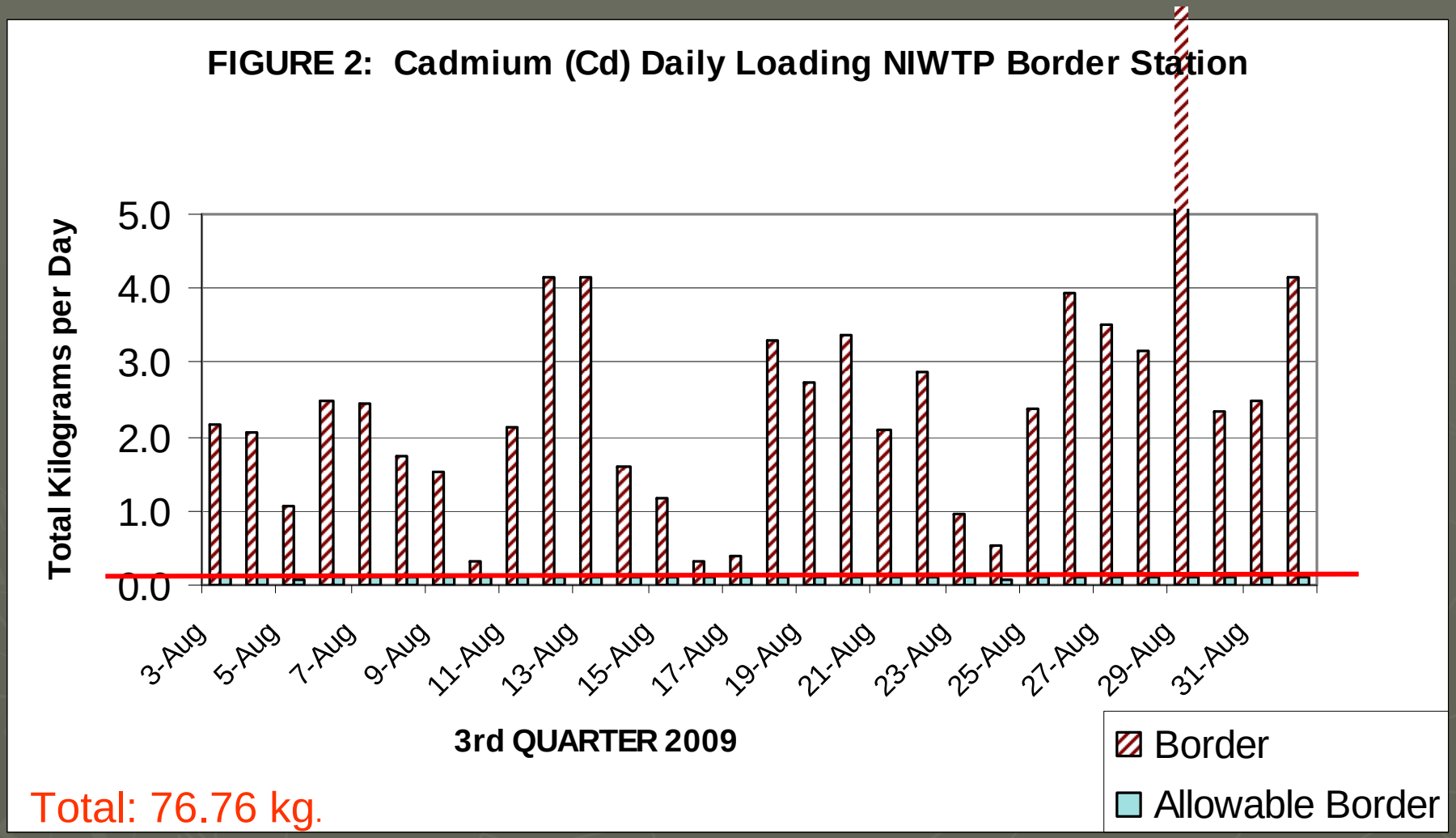
0.29 kg Cd /day

0.82 kg Cd/day

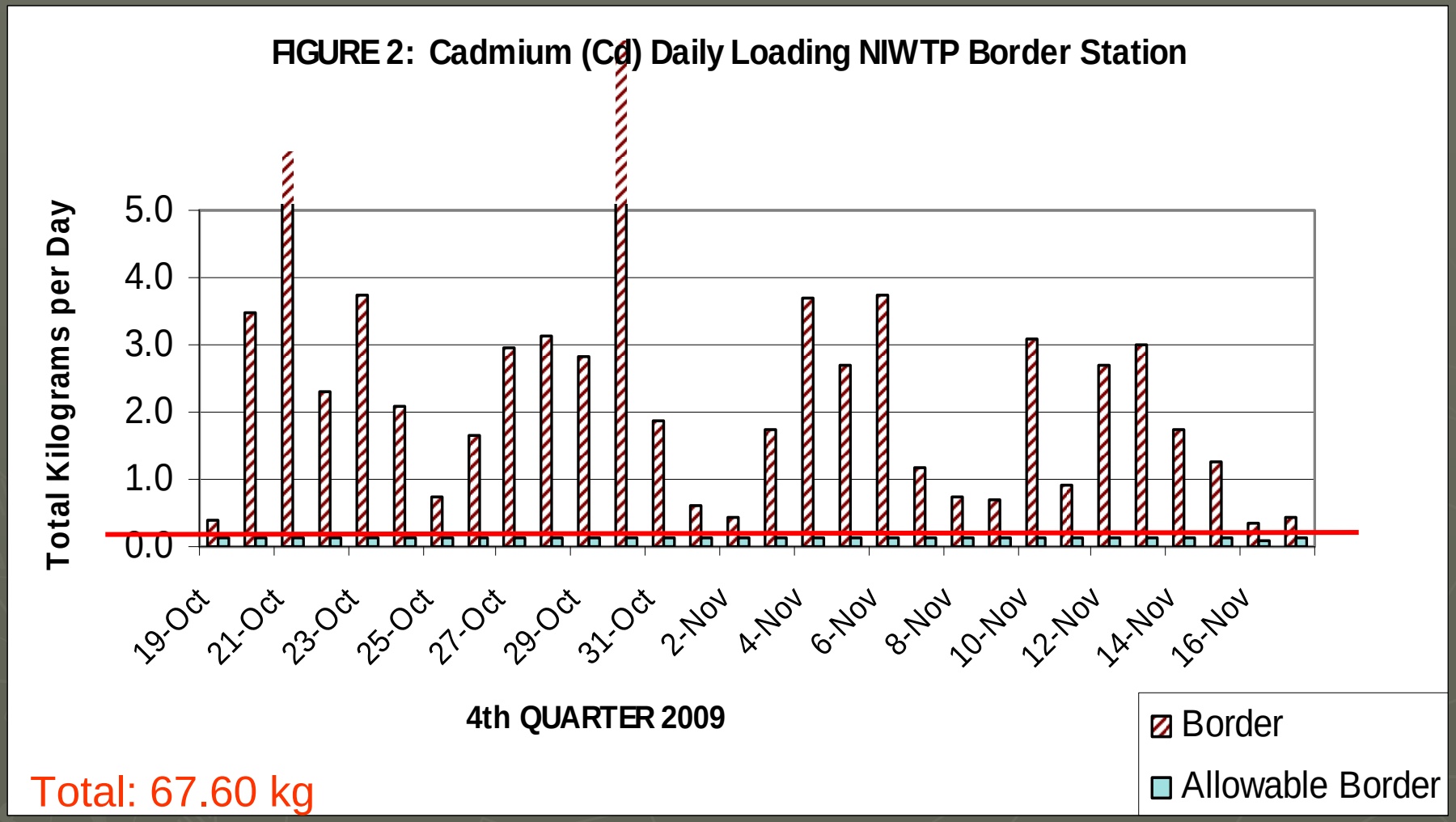
Allowable Headworks Loadings / Permisibles Lodos de Entrada (AHL)

Parameter	5/1997 kg/day	4/2009 kg/day	Change TOT kg/day
Aluminum	NA	NA	0.000
Arsenic	5.43	1.04	-4.386
Barium	92.87	NA	92.873
Cadmium	0.25	0.19	-0.064
Tot Chromium	11.43	0.77	-10.664
Copper	2.00	5.73	3.733
Cyanide	1.86	2.28	0.424
Iron	17.86	NA	17.860
Lead	0.42	0.67	0.245
Manganese	1.93	NA	1.929
Mercury	0.03	0.04	0.006
Nickel	13.57	6.27	-7.301
Silver	1.50	0.83	-0.666
Zinc	19.29	12.13	-7.160
Fluoride	NA	167.28	167.280
Molybdenum	NA	4.70	4.704
Selenium	NA	0.25	0.249

100244
100243
100247
100238
Santa Cruz River Junction
NIWTP
100571
100246
100251
100239
Image © 2009 DigitalGlobe
Image USDA Farm Service Agency
© 2009 Tele Atlas
©2009 Google
Imagery Dates: Jun 21, 2006 - Nov 12, 2006
31°29'21.46" N 110°56'35.15" W elev 3669 ft
Eye alt 28.10 mi



Total: 76.76 kg.



Total: 67.60 kg

Action Item / Línea de Acción

Water and Environment / Agua e Ecología y Medio Ambiente

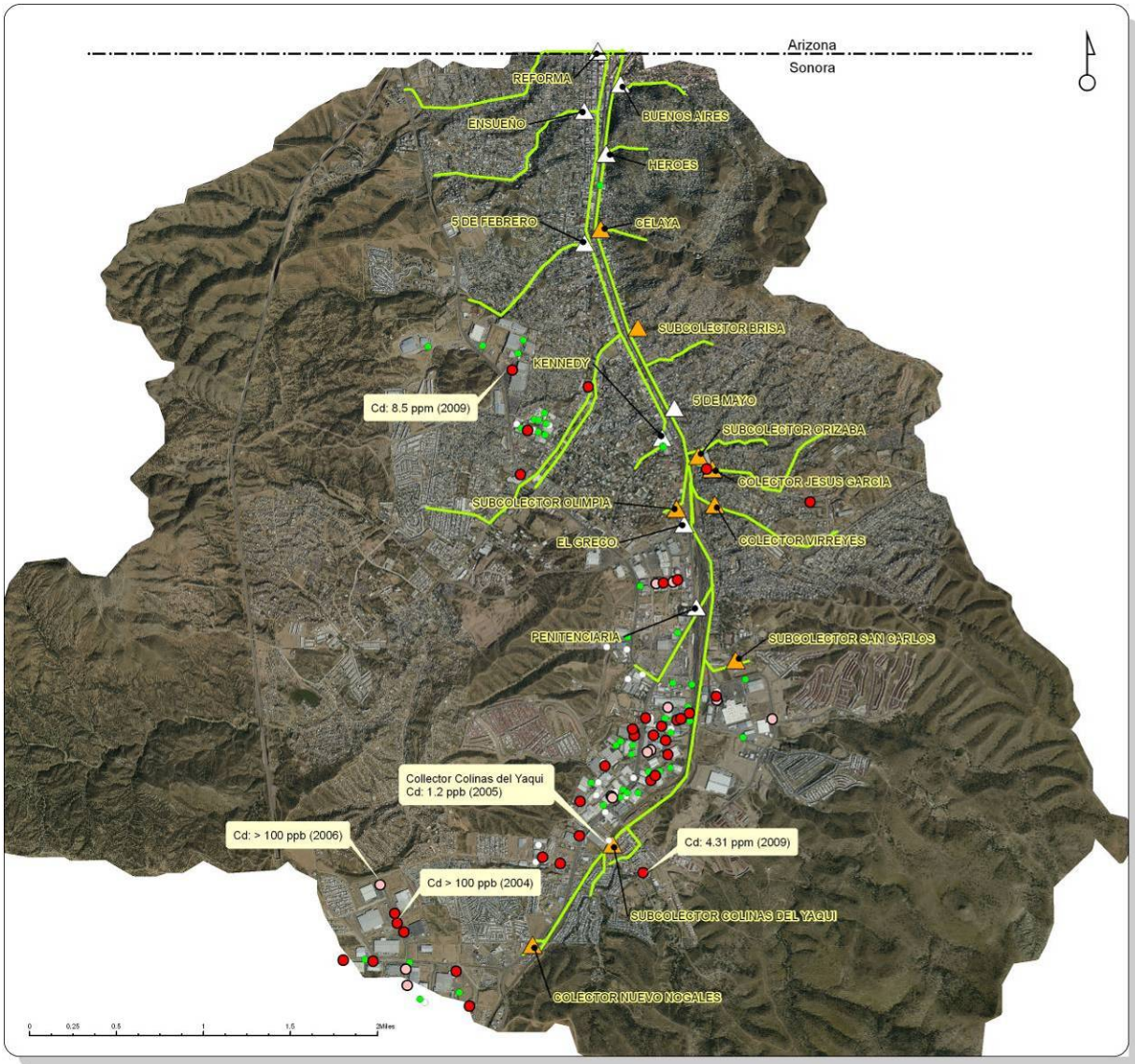
Tactic A: Conduct a qualitative evaluation of both the industrial and commercial sectors of Ambos Nogales in order to identify potential sources of contaminants in wastewater that pose an operational risk to the Nogales International Wastewater Treatment Plant.

Táctica A: Realizar una evaluación cualitativa de los sectores industriales y comerciales en Ambos Nogales con la meta de identificar fuentes potenciales de contaminación en aguas residuales que puedan impactar la operación de la Planta Internacional de Tratamiento de Aguas Residuales de Nogales.

Target Date / Fecha Cumplimiento : 4/2010

OOMAPAS NOGALES

APSA



Nogales, Sonora Base Map

Potential Sources of Cadmium
Last updated August 16, 2010

Figure 1

Given its superior anti-corrosive and pigmentation properties, cadmium is used in a variety of industrial processes. In this context, processes employed by permitted facilities in Nogales, Sonora were reviewed and flagged as potential cadmium sources. Within the 135 permitted facilities identified in the Nogales 2009 pretreatment database, 64 were flagged. Of these, 37 use water in their processing. Of these, four have historically discharged cadmium in wastewater, and two at levels above Mexico's own regulatory limits.

Legend

- 2010 GPS Facilities Cd*
- 2010 GPS Facilities Cd H2O**
- 2010 GPS Permitted Facilities***
- 2010 GPS Facilities closed
- 2007 Manholes Sampled 2005
- 2007 Manholes
- Wastewater Collectors

*Facilities have the potential to use equipment or materials exposed to or containing cadmium.

**Facilities have the potential to use equipment or materials exposed to or containing cadmium AND expose their process to water.

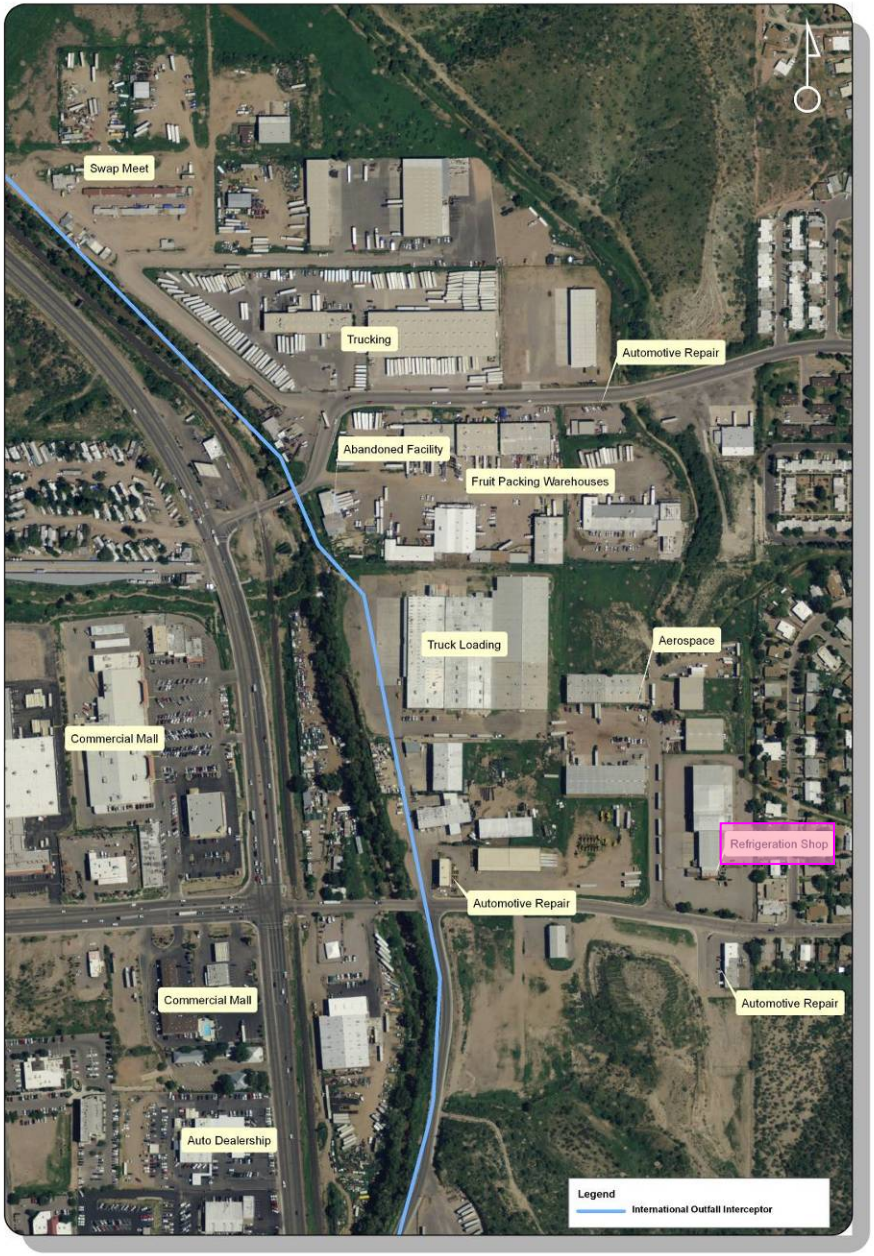
***Not all known industrial facilities are shown given missing GPS data not reflected in the Nogales, Sonora 2009 pretreatment database.

Please note that industrial processes outlined in the Sonora's pretreatment database are somewhat vague. Based on the conservative approach considered by staff, these numbers may be biased on the upper end. OOMAPAS-NS will be engaged for further guidance on flagged facilities.

Last updated: August 16, 2010 by Hans Huth: 520-628-6711

Nogales, Arizona Commerical/Industrial Zone

Figure 2



0 250 500 1,000 Feet

Last Updated by Hans Huth: 520-628-6711
December 22, 2010

Action Item / Línea de Acción

Water and Environment / Agua e Ecología y Medio Ambiente

Tactic B: Use the qualitative evaluation to guide water quality monitoring within the binational wastewater conveyance.

Táctica B: Usar la evaluación cualitativa para guiar monitoreos de calidad de agua en el sistema de alcantarillado binacional.

Target Date / Fecha Cumplimiento : 9/2010

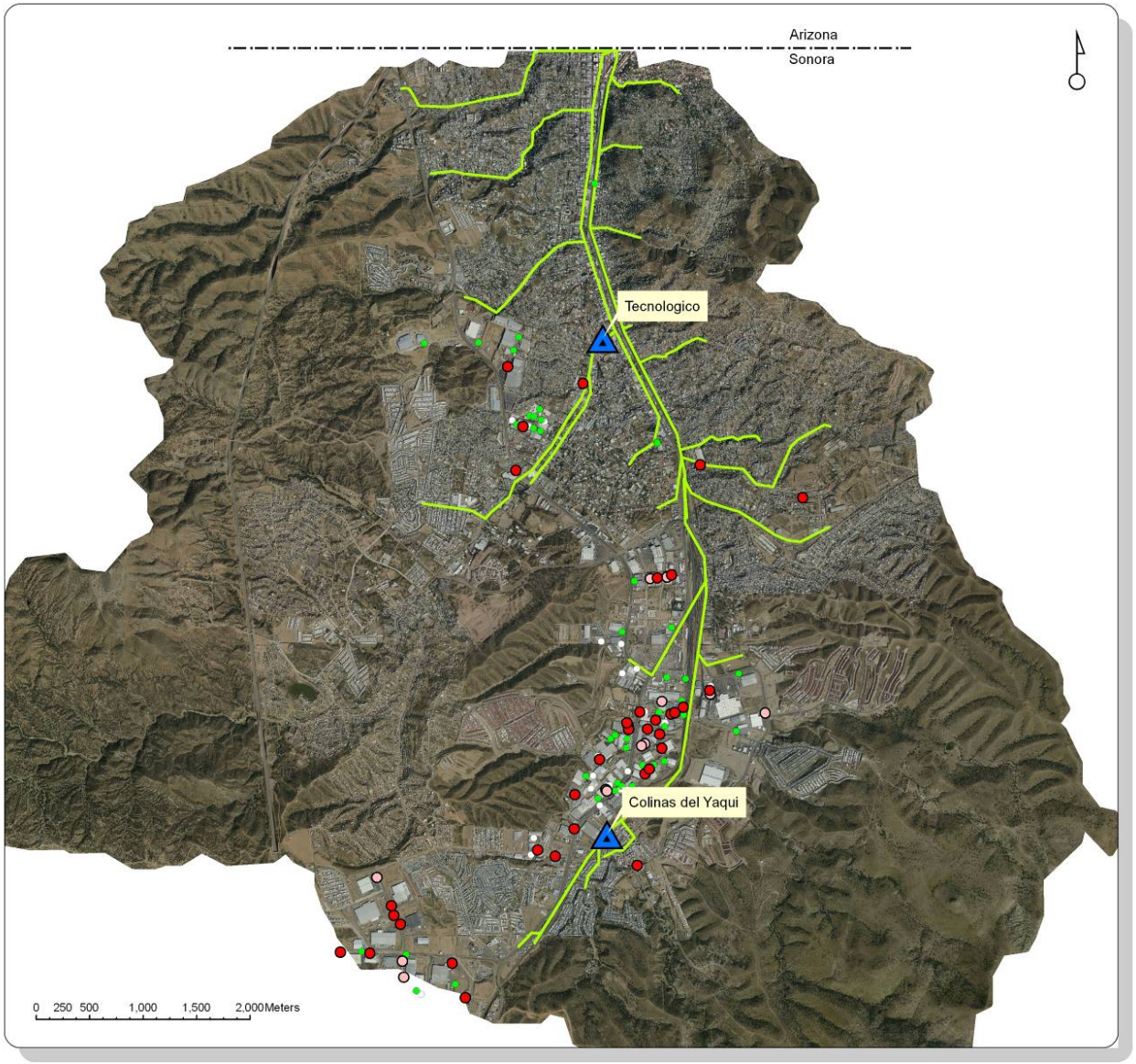
OOMAPAS NOGALES

WESTERN ENVIRONMENTAL EQUIPMENT COMPANY, INC.

8320 E. Gelding Dr., Suite 101 Scottsdale, AZ 85260
Local: 480-607-2884 Fax: 480-607-7009

City of Phoenix
Industrial Pollution Prevention Program

ADEQ
Arizona Department of Environmental Quality



Nogales, Sonora Base Map

October Monitoring Locations
Last updated October 8, 2010

Figure 3

Given its superior anti-corrosive and pigmentation properties, cadmium is used in a variety of industrial processes. In this context, processes employed by permitted facilities in Nogales, Sonora were reviewed and flagged as potential cadmium sources. Within the 135 permitted facilities identified in the Nogales 2009 pretreatment database, 64 were flagged. Of these, 37 use water in their processing. Of these, four have historically discharged cadmium in wastewater, and two at levels above Mexico's own regulatory limits.

Legend

- OOMAPAS-NS Monitoring Sites
- 2010 GPS Facilities Cd H2O**
- 2010 GPS Facilities Cd*
- 2010 GPS Permitted Facilities***
- 2010 GPS Facilities Closed
- Wastewater Collectors

*Facilities have the potential to use equipment or materials exposed to or containing cadmium.

**Facilities have the potential to use equipment or materials exposed to or containing cadmium AND expose their process to water.

***Not all known industrial facilities are shown given missing GPS data not reflected in the Nogales, Sonora 2009 pretreatment database.

Please note that industrial processes outlined in the Sonora's pretreatment database are somewhat vague. Based on the conservative approach considered by staff, these numbers may be biased on the upper end. OOMAPAS-NS will be engaged for further guidance on flagged facilities.

Last updated: October 8, 2010 by Hans Huth: 520-628-6711

GMC

MEDIA
HORIZONTALES Y ROMANA
DE MADERA

Action Item / Línea de Acción

Water and Environment / Agua e Ecología y Medio Ambiente

Tactic C: Develop an action plan to mitigate sources of contaminants in binational wastewater, implement highest priority action, and report on progress.

Táctica C: Desarrollar un plan de acción para mitigar las fuentes de contaminantes en aguas residuales binacionales, implementar acciones de mas alta prioridad, y reportar sobre los avances.

Target Date / Fecha Cumplimiento: 12/2010

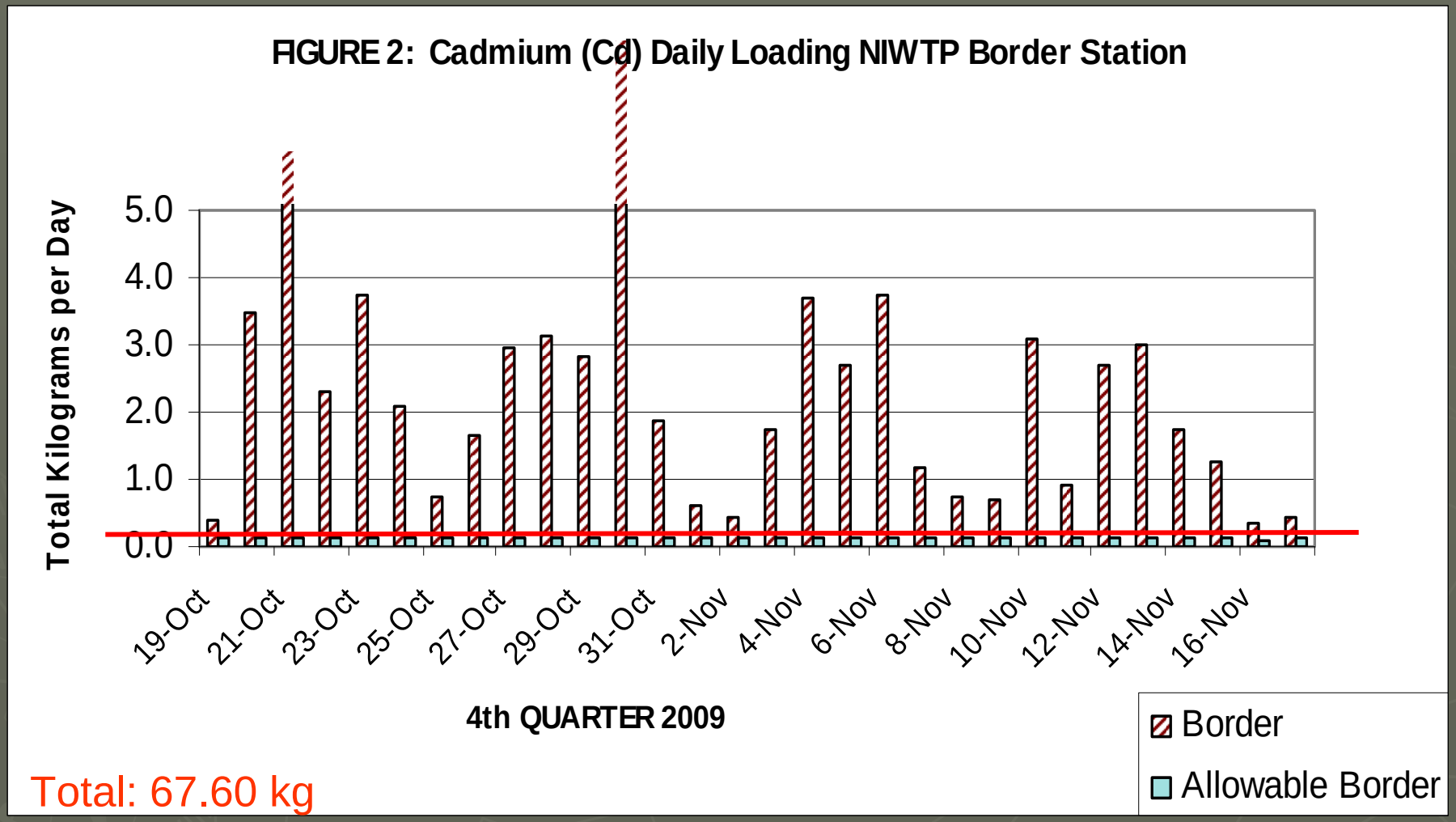
OOMAPAS NOGALES

ADEQ Arizona Department of Environmental Quality

BORDER 2012 FRONTERA 2012

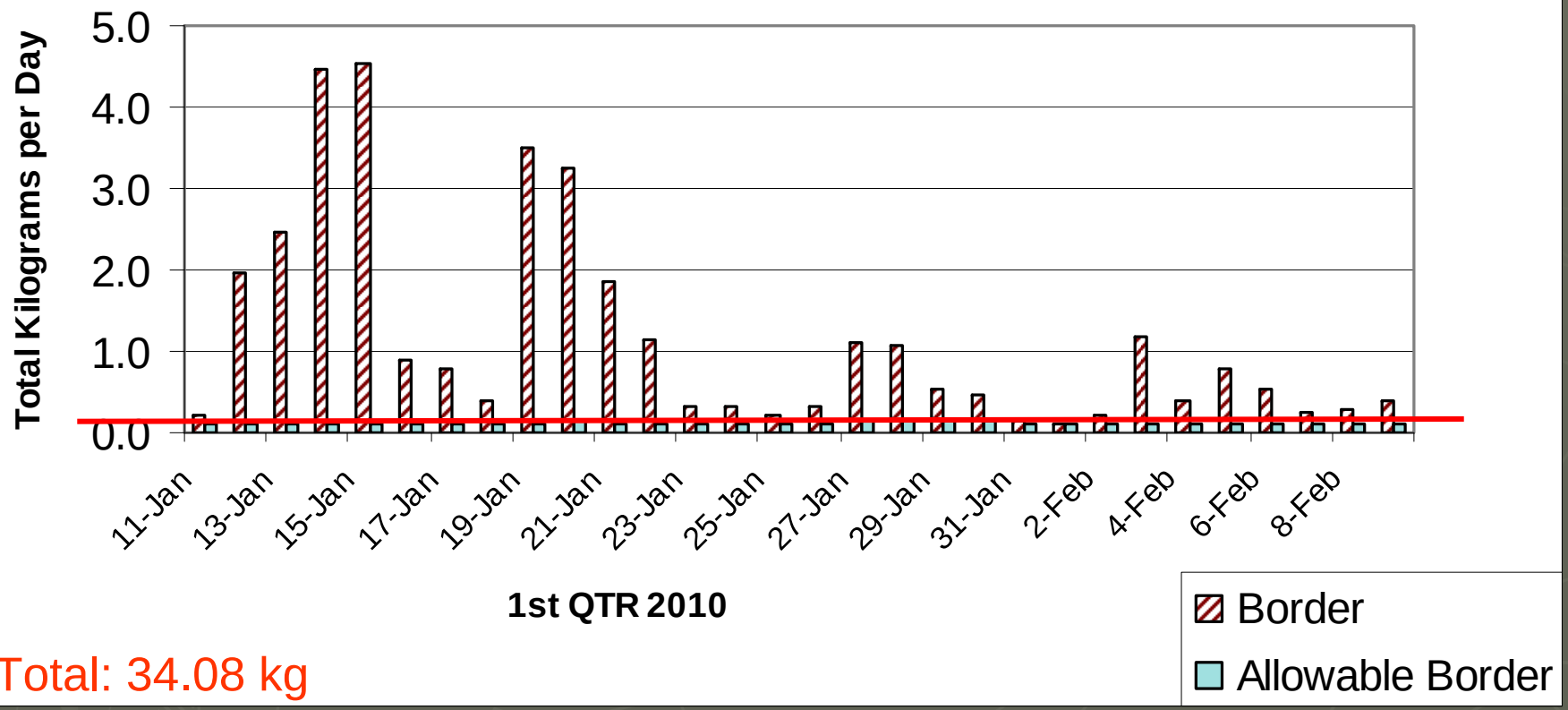
Raising Consciousness Regarding the Challenge
Concientización de la Problemática

Date	Entity	Forum	Scope
11/25/2009	Association of Environmental Safety Engineers (APSA)	Monthly Meeting	Regulated community briefed on wastewater quality challenges.
12/4/2009	Arizona Mexico Commission (AMC)	December Plenary	Action Item on Source characterization and mitigation of metals in wastewater is signed.
2/10/2010	Nogales Sonora Public Works Department (OOMAPAS-NS)	Interagency Meeting	Briefing on AMC action item.
2/10/2010	APSA	Monthly Meeting	Regulated community engaged on action item and asked for assistance with source characterization.
3/3/2010	Association of Maquiladoras of Sonora (AMS)	Board of Directors	Plant managers briefed on wastewater quality challenges and goals of AMC action item.
4/30/2010	OOMAPAS-NS	Interagency Meeting	Progress report on AMC action item is prepared.
6/10/2010	City of Phoenix Pollution Control Division	Interagency Meeting	Solicited equipment support for the Nogales Sonora Pretreatment Program.
6/25/2010	State of Sonora Water Commission (CEA)	Interagency Meeting	CEA requested progress report on AMC action item and offers support as needed.
6/30/2010	OOMAPAS-NS	Interagency Meeting	Updated progress report on AMC action item, and compiled list of equipment needs for pretreatment monitoring.
6/30/2010	APSA	Monthly Meeting	Regulated community updated on AMC action item progress.
8/18/2010	OOMAPAS-NS	Interagency Meeting	Discussed source characterization and regulatory actions.
9/23/2010	APSA	Annual Meeting	Regulated community briefed on wastewater quality challenges and progress related to AMC action item.
12/10/2010	AMS	Board of Directors	Plant managers briefed on progress associated with AMC action item.

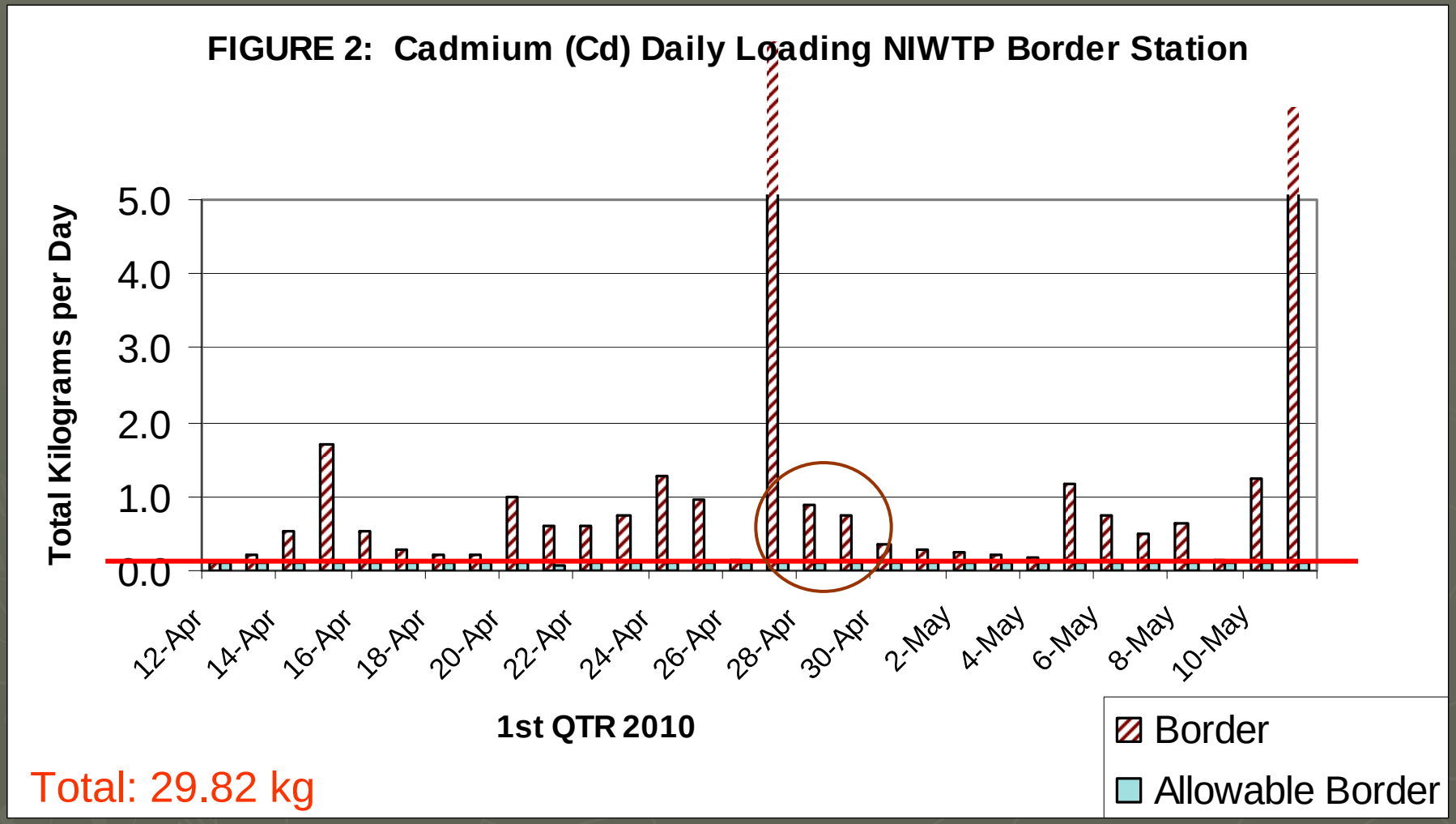


Total: 67.60 kg

FIGURE 2: Cadmium (Cd) Daily Loading NIWTP Border Station



Total: 34.08 kg



Total: 29.82 kg

FOSCR Monitoring Cadmium / Monitoreo de FOSCR Cadmio, 1/2010 – 4/2010

Date	Total Cd (ug/l)	Dis. Cd (ug/l)	Hardness[a] Ca+Mg (ppm)	Standard (ug/l)	Exceedance
1/26/10	ND	ND	153	0.75	No
4/29/10	4.1	3.5	147	0.73	Yes

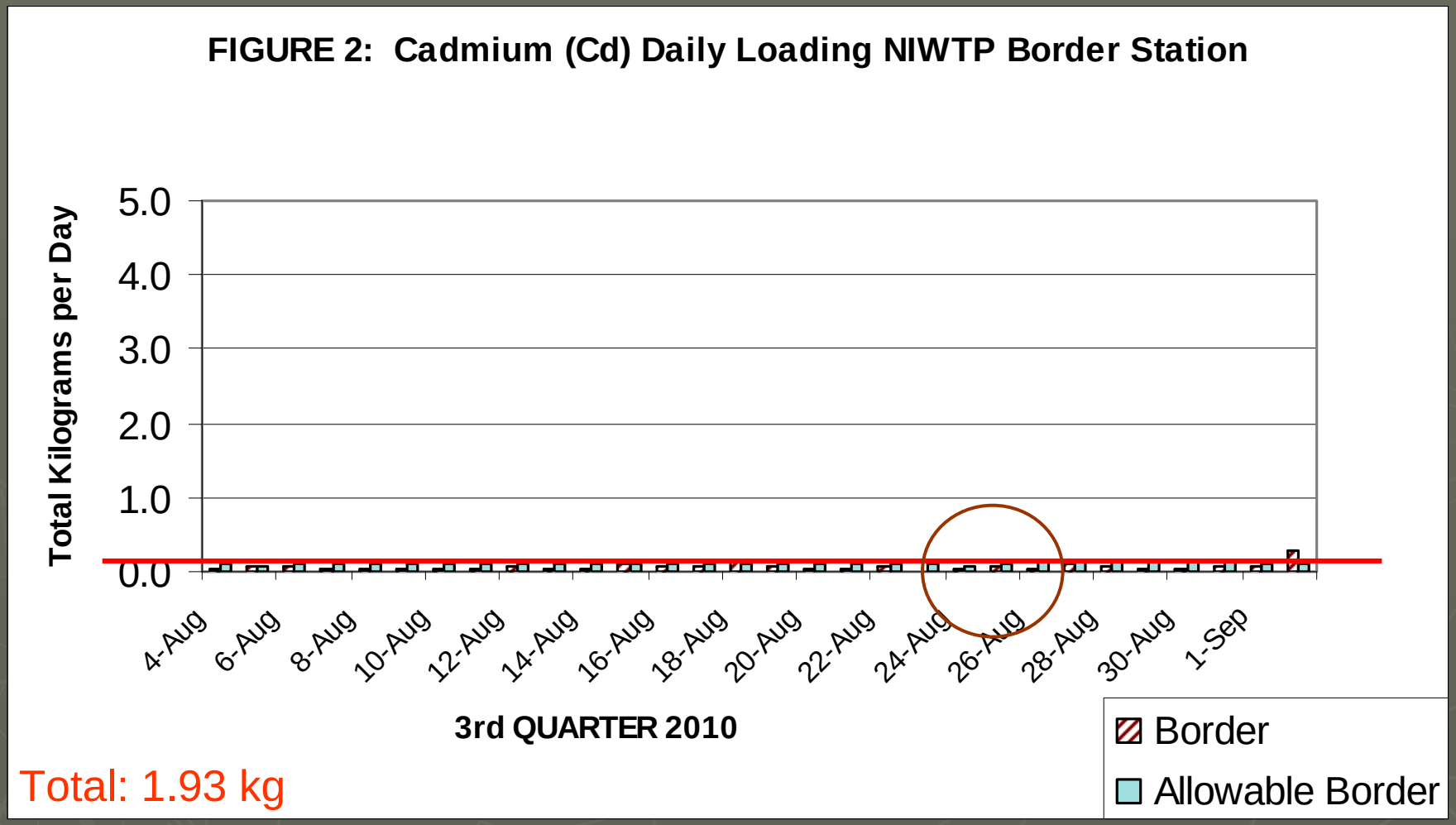


FIGURE 2: Cadmium (Cd) Daily Loading NIWTP Border Station
Total Kilograms per Day
5.0
4.0
3.0
2.0
1.0
0.0
4-Aug
6-Aug
8-Aug
10-Aug
12-Aug
14-Aug
16-Aug
18-Aug
20-Aug
22-Aug
24-Aug
26-Aug
28-Aug
30-Aug
1-Sep
3rd QUARTER 2010
Border
Allowable Border

Total: 1.93 kg

FOSCR Monitoring Cadmium / Monitoreo de FOSCR Cadmio, 1/2010 – 8/2010

Date	Total Cd (ug/l)	Dis. Cd (ug/l)	Hardness[a] Ca+Mg (ppm)	Standard (ug/l)	Exceedance
1/26/10	ND	ND	153	0.75	No
4/29/10	4.1	3.5	147	0.73	Yes
8/25/10	ND	ND	160	0.78	No

August 4, 2010: ADEQ receives IBWC notification that biosolids have high levels of cadmium."

4 Agosto, 2010: ADEQ recibe notificación de IBWC que los lodos biológicos de la planta contienen altos niveles de cadmio.

$400K

08.26.2010

$2.5M

$5M
05.27.2005

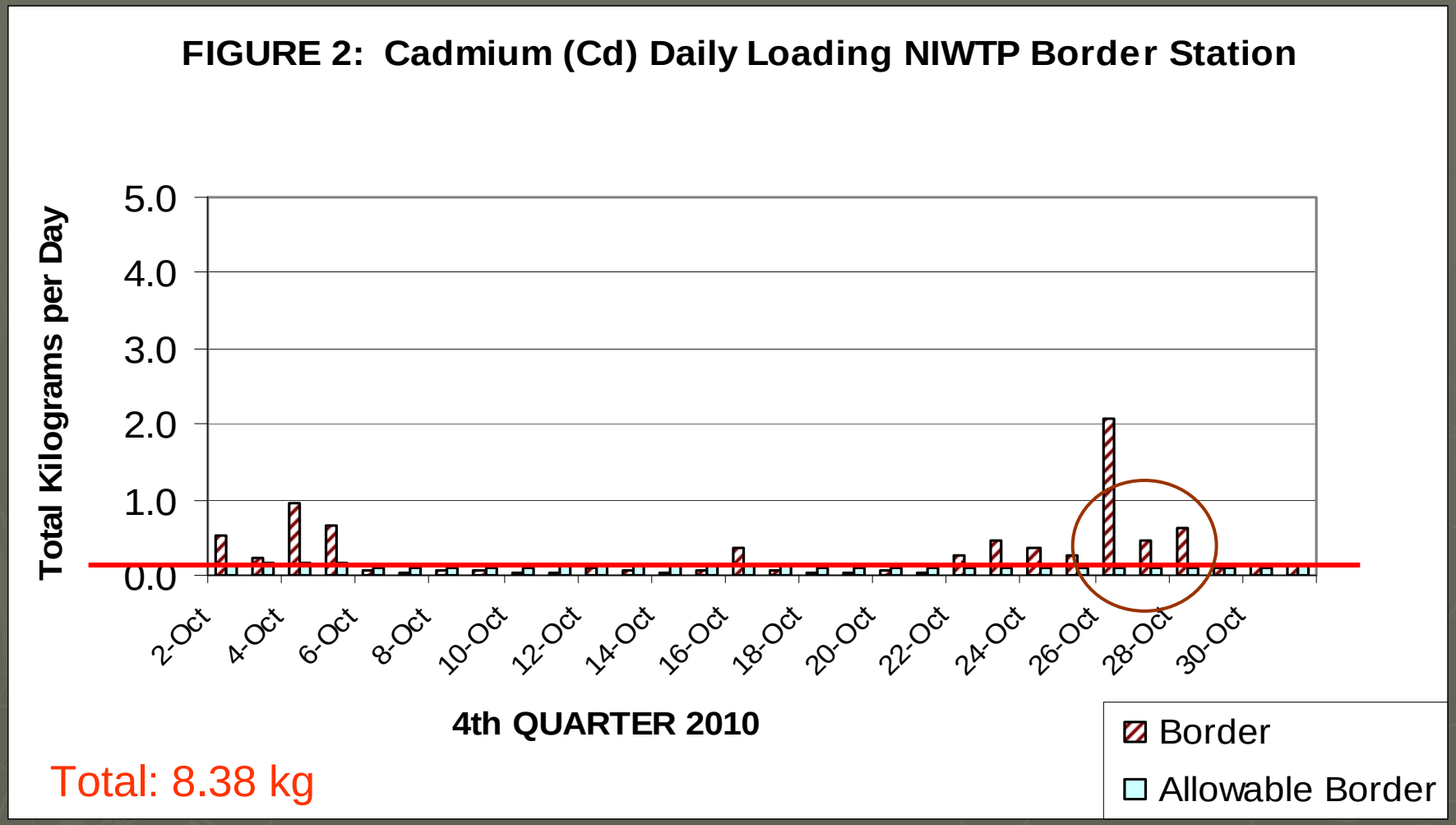


FIGURE 2: Cadmium (Cd) Daily Loading NIWTP Border Station
Total Kilograms per Day
5.0
4.0
3.0
2.0
1.0
0.0
2-Oct
4-Oct
6-Oct
8-Oct
10-Oct
12-Oct
14-Oct
16-Oct
18-Oct
20-Oct
22-Oct
24-Oct
26-Oct
28-Oct
30-Oct
4th QUARTER 2010
Border
Allowable Border
Total: 8.38 kg

FOSCR Monitoring Cadmium / Monitoreo de FOSCR Cadmio, 1/2010 – 10/2010

Date	Total Cd (ug/l)	Dis. Cd (ug/l)	Hardness[a] Ca+Mg (ppm)	Standard (ug/l)	Exceedance
1/26/10	ND	ND	153	0.75	No
4/29/10	4.1	3.5	147	0.73	Yes
8/25/10	ND	ND	160	0.78	No
10/27/10	2.31	2.06[+]	170	0.81	Yes

Metrics Related to Binational Efforts
Progreso Asociados con Esfuerzos Binacionales

Allowable Headworks Loading for Cadmium: 0.19 kg/day
Permisible Total de Cadmio: 0.19 kg/dia

Month, Year Mes, Año	Average Concentration Promedio de concentración (ppb)	Average Daily Loading Promedio de lodo (kg/day)	Standard Deviation Desviación Media (kg/day)	Monthly Loading Lodo Mensual (kg)
August, 2009	59	2.65	2.02	76.76
October, 2009	50	2.25	1.66	67.60
January, 2010	25	1.14	1.28	34.08
April, 2010	27	0.99	1.60	29.82
August, 2010	1.5	0.06	0.05	1.93
October, 2010	7.2	0.28	0.41	8.38

Sustainability is a consideration.
Sostenibilidad es una consideración.

Sustainability is a consideration.
Sostenibilidad es una consideración.

Sustainability is a consideration.
Sostenibilidad es una consideración.

Minute 276: Conveyance, Treatment and Disposal of Sewage from Nogales, Arizona And Nogales, Sonora Exceeding the Capacities Allotted to the United States And Mexico Under Minute Number 227.

APSA

OOMAPAS NOGALES

AMS

City of Phoenix
Industrial Pollution Prevention Program

HACH

CEA
COMISIÓN ESTATAL DEL AGUA

WESTERN ENVIRONMENTAL EQUIPMENT COMPANY, INC.

8320 E. Gelding Dr., Suite 101 Scottsdale, AZ 85260
Local: 480-607-2884 Fax: 480-607-7009

ADEQ
Arizona Department of Environmental Quality

INTERNATIONAL BOUNDARY AND WATER COMMISSION
COMISIÓN INTERNACIONAL DE LIMITES Y AGUAS

Further Communication
Comunicación Adicional

Ing. Jesus Quintanar
Nogales, Sonora Representative
IBWC, Mexican Section
cila_nogales@cilamexeua.gob.mx
631-313-9629

John M. Light,
Area Operations Manager
IBWC, U.S. Section
John.Light@ibwc.gov
(520) 281-1832

I.Q. Verónica Meranza Castillon
Nogales, Sonora Municipal Pretreatment Program
Organismo Operador Municipal de Agua Potable y Aguas Sanitarias
veronica.meranza@oomapasnogales.gob.mx
631-314-7272