Updated April 5, 2013

Prepared for

Texas Commission on Environmental Quality

Prepared by

Texas Custodial Trust

Project Navigator, Ltd.
2301 W. Paisano Dr.
El Paso, Texas 79922
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1.0 INTRODUCTION

This document describes the methods, procedures and control measures used by the Texas Custodial Trust (Trust) to perform explosive demolition of two concrete chimneys at the former Asarco Smelter in El Paso, Texas. The explosive demolition will be conducted under the direction of Brandenburg Industrial Service Company (Brandenburg) by Dykon Explosive Demolition Corporation (Dykon). This document will serve as the Trust’s central location to communicate blast event plans. Specifically, the document will provide information regarding:

- Explosive demolition approach;
- Potential vibration impacts;
- Potential dust generation evaluations and control mechanisms;
- Security controls;
- Public traffic controls; and
- Stakeholder engagement activities.

Many details of the events will continue to be developed ahead of the blast and as a result, this document will be updated as details are developed.

1.1 Background

As part of site demolition, remediation and restoration activities, the Trust is demolishing the two concrete chimneys at the former Asarco smelter. The two chimneys consist of an 828-foot continuous poured concrete chimney constructed in 1966 and a 612-foot chimney constructed in 1950. The 828-foot chimney serviced the copper smelter and consists of an outside concrete shell approximately 62.5 feet in outside diameter at the base with a 35.5-foot diameter concrete liner. This effectively forms a chimney within a chimney. The 612-foot chimney serviced the lead smelter and is approximately 46 feet in outside diameter at the base.

1.2 Project Team

The Trust selected Environmental Resources Management (ERM) to manage demolition and asset recovery operations at the former smelter. The demolition contractor has been Brandenburg. This team has demolished most site features and has operated safely on the site with nearly 200,000 project man-hours without any Occupational Safety Health Administration (OSHA) recordable injuries or illnesses.

The ERM / Brandenburg team having significant site experience will perform demolition of the concrete chimneys. Brandenburg has selected Dykon to design and execute the explosive demolition plan. Dykon is led by Mr. Jim Redyke, a Bureau of Alcohol, Tobacco, Firearms and Explosives-licensed blaster with over 40 years of experience.
Brandenburg and Dykon have significant large-scale demolition and explosive demolition experiences including:

- Dykon is responsible for the felling of more than 100 chimneys around the world.
- Dykon recently executed the successful implosion of Cowboy Stadium in Irving, TX.
- Brandenburg is responsible for the felling of smelter chimneys in San Manuel, AZ and Silver City, NM, and numerous other chimneys throughout the US.
- Brandenburg executed the successful explosive demolition of Veteran's Stadium in Philadelphia, PA.
- Brandenburg and ERM have been involved in the management, planning, oversight and implementation of many explosive demolitions, several of which have been chimney demolitions.
- Brandenburg and ERM also have experience in coordinating such events with local authorities and external stakeholders.
- Brandenburg, ERM and Dykon have a long working relationship.

As the demolition contractor, Brandenburg is responsible for developing the Blast Event Coordination Plan. As with this summary document, Brandenburg’s plan will be continuously updated as details are finalized. Brandenburg’s event plan is included as Appendix A.

2.0 BLAST EVENT SCHEDULE

The chimney demolition is scheduled for April 13, 2013 near sunrise. The exact time will be determined by the blaster the day of the blast depending on the completion of blast preparations, traffic control implementation, and weather conditions.

The demolition date was set based on timing to facilitate overall site remediation and restoration. City of El Paso officials were consulted in addition to reviewing planned public events in the city. Because of the high level of coordination with multiple stakeholders and public inconveniences due to traffic controls, the work was scheduled on a Saturday with a backup day on Sunday in case the demolition must be re-scheduled.
3.0 EXPLOSIVE DEMOLITION APPROACH

The explosive demolition approach is being designed and executed by Dykon. Dykon has subcontracted the structural analysis of the blast plan to Mr. Paul Rose, PE (Texas) of Phillips Slaughter Rose. The Dykon Blast Plan and the structural analysis are included as Appendix B. A summary of the information provided in Appendix B is presented below for ease of use.

The general approach to demolish the chimneys is to fall the structures like a tree letting gravity do the work. Prior to the demolition, the area is prepared, and a circular fall exclusion zone equal to 1.5 times the height of each chimney is established along with other items described in this document. During the blast event, no personnel will be allowed in the fall exclusion zone.

First, a small portion of the bottom of the chimney on the fall side is removed. The back side (side opposite of the direction of fall) reinforcing steel is cut to allow the chimney to rotate over like a tree in the direction of fall along two hinge points. Second, explosives are used to remove a section on a side where the chimney will fall. And, third, the chimney will fall like a tree in the target fall zone set by the engineers. A general summary of this approach is illustrated in Figure 1.
The targeted fall zone for the chimneys is to the east, toward the center of the site (see Figure 2). The fall exclusion zone area is based on guidelines provided by the National Demolition Association’s Safety Manual and provides a sufficient safety buffer for debris and dust control around the area as well as a control zone for any unlikely change in the intended fall direction.

Explosives will be managed under the direction of the licensed blaster. Under El Paso City ordinances, the El Paso Fire Marshall is the permitting authority for the work.

The structural analysis indicates that the chimneys in their “prepared for demolition state” will remain stable and the fall of the structures will not be affected in sustained winds of 15 mph and in wind gusts of 30 mph. Consequently, weather conditions will be monitored, and if steady winds of 15 mph or more, or wind gusts of 30 mph or more are predicted for the site at the time of the demolition, the demolition will be delayed. The Weather Monitoring Plan is included in Appendix B. The blaster will be monitoring the weather conditions via the on-site weather station and available computer-based weather data.

Figure 2: Fall Zone Preparations
4.0 POTENTIAL VIBRATION IMPACTS

Vibrations from explosive demolition events can potentially impact nearby structures. Protec Documentation Services (Protec) was contracted to evaluate the potential for vibration impacts. Protec used site-specific data provided by Brandenburg and Dykon to prepare a vibration model simulating the effects of discharge of the explosives or vibrations due to the chimneys hitting the ground. The model results were compared to thresholds developed by the United States Bureau of Mines (USBM) for vibration damage and were found to be within acceptable limits for the remaining on-site structures (i.e. the Powerhouse and Administration Building). The study assessed structures within a half-mile radius of the chimneys, and no damage is expected to structures. Protec's summary report is included in Appendix C.

Ahead of the blast, field seismographs will be placed at several locations, both on and off site. Exact monitoring locations are being determined by the project team and will be identified in Appendix C when finalized. The monitoring stations include field seismographs that measure peak particle velocity vibration levels on horizontal, longitudinal and transverse channels. A fourth channel will measure air overpressure. A report summarizing the vibration data observed during the demolition event will be prepared by Protec after the event.

5.0 POTENTIAL DUST GENERATION EVALUATIONS AND CONTROL MECHANISMS

Predictive Evaluation

Dust can be generated during explosive demolition of concrete chimneys from two primary sources. One is ground dust “pushed” into the air from the force of the structures hitting the ground. The other source is from the breaking of the concrete by the explosives and by the chimneys hitting the ground. At the request of the Trust, ERM performed air dispersion modeling to assess potential impacts to ambient air quality at the site property boundaries. Applicable site-specific compounds were evaluated. The approximate ambient air concentration of each modeled compound was compared against the compound's defined National Ambient Air Quality (NAAQS) standard or TCEQ Effects Screening Level (ESL) limit, as applicable. The model will be revised based on analytical data from concrete cores collected from each chimney. The modeling summary report is included in Appendix D. Based on the modeled conditions, there are no exceedances expected at the property boundaries of the NAAQS or ESL limits for the evaluated constituents.

Blast Event Monitoring

On the day of the blast, ambient air dust monitoring will be conducted at the perimeter of the site. This approach is similar to the ongoing ambient air monitoring program that was established when field work began in 2011. Visible dust from the event will be monitored and Brandenburg response crews will be deployed as necessary to address areas where significant dust cloud movement is observed off-site.
Dust Control Mechanisms

Several redundant dust control measures are being implemented before and during the blast event to reduce the potential for dust generation during the blast. This cautious “belt and suspenders” approach to dust control is outlined below and several components of this approach are depicted in Figure 2:

- Removal of the accumulated dust within and at the base of each chimney. This has already been done for the 828-foot chimney. Dust from the 612-foot chimney is being removed and will be completed prior to demolition. This material will be staged on site for future disposal in the on-site waste cell.

- Insulation material on the outside of the interior chimney for the 828-foot chimney will be removed. The insulation consists of 3-inch thick fiberglass material extending from the ground surface to approximately 110 feet upward from the base of the chimney. This material will be staged on site for future disposal in the onsite waste cell.

- Application of tackifier (adhesive-like material) on the inside surface of each chimney. Based on ground observations and pictures from recent visual observations of the chimneys, the inside walls do not have significant visible accumulations of dust. However, the application of a tackifier, where safely possible, will further reduce the potential for dust from being dispersed into the air. The tackifier will be applied by positioning a water mist applicator at the bottom of the chimney to spray the mixture around the inside surfaces.

- Construction of berms along the target fall zones is designed to reduce the lateral extent of the dust cloud and contain dust in the fall zone.

- Construction of berms and a hardened “backstop” around the sides and back side of the chimneys to reduce the potential for fly-rock generation and redirect generated dust toward the site.

- Installation of a cover over approximately a 400-foot section of the American Canal near the site. This cover is designed to prevent small fly-rock fragments and gross dust from landing in the canal.

- Installation of a three-part ground cover dust control system in the target fall zone that consists of:

  1. Installing a geotextile liner on top of the existing site soil.

  2. Placing one-foot of imported clean soil fill over the target fall zone. Coverage will be from the inside of each berm extending approximately 30% beyond the length of each chimney’s height (e.g., for the 828-foot chimney, imported soil fill will extend out to approximately 1076 feet from the base)
3. Spraying a soil binder on top of the imported soil fill. A similar material is used by the US military to reduce dust at helicopter landing zones.

- Installation of one of the largest water mist dust control applications attempted for a chimney fall. As shown in Figure 2, a minimum of 21 articulated water mist application units will be installed around the target fall zones. These units provide a fine mist of water and will come in two sizes. One type generates a mist at a rate of about 140 gallons/minute/unit for a distance of up to 300 feet, and the other generates a mist at a rate of about 80 gallons/minute/unit for a distance of up to 150 feet. This “mist curtain” is designed to reduce the amount of dust particulates in the air.

The water mist system will be started 15-20 minutes before the start of demolition, and it is planned to operate for about 15 minutes after the chimneys have made impact with ground surface. Most of the water from the mist system is expected to be absorbed by dry soil and chimney debris, but there may be some ponding of water into onsite sumps. The sumps are part of a robust storm water management system at the former ASARCO plant site. The chimneys, the fall zones, water mist system, and sump areas are located within what is considered a zero-discharge facility. Water is collected in sumps and directed to two onsite storm water ponds with approximately 12,000,000 gallons of capacity. Sampling of the captured storm water and/or discharge will be in accordance with the site storm water management plan that has been in place since the beginning of the Trust’s on-site work. The water quality limits are set in a TPDES Multi-Sector General Permit.

After demolition of the chimneys, the fall zone materials and chimney debris will be managed on site. Rebar from the concrete will be removed and recycled. It is anticipated that some of the chimney concrete will be intermingled with the fall-zone soils and surrounding berm material. The Trust’s environmental team has evaluated the stack concrete by collecting concrete core samples and submitting the samples to a laboratory for analysis of metals, volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs). The concentrations of metals in the concrete are substantially less than the concentrations found in Category II and III materials on site. VOC and SVOC concentrations are negligible (see Recastingthesmelter.com, frequently asked questions for sample results).

In accordance with the approval letter from the Texas Commission on Environmental Quality (see letter dated March 22, 2013), post-demolition sampling of debris (e.g. stack concrete and the surrounding fall-zone soil materials) will take place prior to in-site disposal. Stack and fall zone materials are anticipated to be managed as Category II materials (e.g. under the planned soil cover) based on the results of the pre-demolition sampling. However, final categorization and management of the materials will be based on post-demolition sampling results.
6.0 SECURITY CONTROLS

Security is a very important component of this event, especially given the location relative to the international border. Once explosives arrive on site, 24-hr per day security will be provided to monitor the explosives. Detailed security plans are being developed by the demolition team in coordination with the El Paso Police and Fire Departments and the US Border Patrol. Security will be provided through the El Paso Police Department and other law enforcement agencies as needed. Security details including any information about the transport and storage of explosives are limited to authorized personnel only. Site security the day the event will be strictly enforced and trespassing will not be tolerated.

7.0 PUBLIC TRAFFIC CONTROLS

Select public roadways will be closed for public safety and to facilitate site security. Only one public street in the United States, West Paisano Drive, is in the potential fall zone if the chimneys fall in an unintended direction. Interstate 10 is more than 1,800 feet away from the base of the nearest chimney and is being closed to reduce the potential for traffic accidents to occur during the event.

Road closures will vary from approximately 3 hours before and up to 3 hours after the blast. The road closures are summarized on Figures 3 through 6. The closures will be permitted through the Texas Department of Transportation (TxDOT) and the City of El Paso Transportation Department, as applicable. Detailed traffic control plans are included in Appendix 2 of Appendix A.

In addition to public roadways, railroads operated by Union Pacific and Burlington Northern Santa Fe are located adjacent to the site. Both operators have been contacted and train movement will be prevented in the area during the event. After demolition, railroad-provided teams will inspect each track prior to reopening for rail service.
Figure 3: Road Closures Approximately 3 Hours Before the Blast

Figure 4: Road Closures Approximately 15 Minutes Before the Blast
Figure 5: Road Closures Approximately 15 Minutes After the Blast

Figure 6: Road Closures Approximately 1 Hour After the Blast
(The remainder of W. Paisano Dr. will open Approximately 2-1/2 hrs After the Blast)
Contingency Planning

The targeted fall zone for the chimneys is located well inside the site property, away from the property boundaries. As previously described, a potential fall zone (i.e., the fall exclusion zone) equal to 1.5 times the height of each chimney has been established in a circle around each chimney. Most of this area is located on site in which case, fall in an unintended direction will result in the chimneys landing in vacant site property, the dust control berms, or site buildings that will be unoccupied at the time of the blast. The largest safety concern is for an unintended chimney fall backward, toward the west. In this scenario, the chimneys would fall outside of the site boundary, across West Paisano Drive. The 612-foot chimney could also have the potential to fall across the Rio Grande River. West Paisano Drive will be closed prior to the blast to prevent the public from being the fall exclusion zone. The City of Juarez, Mexico officials are being asked to close streets in Juarez that are within the fall exclusion zone.

In the remote event that one or both chimneys fall to the west across West Paisano Drive, the demolition contractor will coordinate response activities with the City of El Paso Office of Emergency Response (EPOER). Because the public will be kept out of the fall exclusion zone, it is anticipated the response will consist mainly of providing heavy equipment to remove debris from the roadway. In addition, if impacts occur at the international border, response activities will be coordinated by the US Border Patrol. Since EPOER will have the lead, they will assess the situation, coordinate with all affected stakeholders, establish priorities for action, and initiate corrective action on a priority basis. The demolition team will work with EPOER and provide available resources.
8.0 STAKEHOLDER ENGAGEMENT ACTIVITIES

Blast event planning has focused on engaging applicable stakeholders to seek their input and keep them informed throughout the process. Starting in January 2013, the Trust has hosted biweekly meetings with the Trust’s demolition team and City of El Paso representatives including the El Paso City Construction Manager, Fire Marshall, Office of Emergency Management and the Police Department. As plans have developed, additional stakeholders have been included in those meetings including representatives from City of El Paso Transportation Department and TxDOT. Additional meetings have been held with governmental agency stakeholders, including the TCEQ, USEPA, FAA, US Border Patrol, International Boundary Water Commission (IBWC), and the City of Juarez.

Non-governmental stakeholders that have been or will be contacted prior to the event include Union Pacific Railroad, Burlington Northern Santa Fe Railroad, the University of Texas at El Paso (UTEP), and businesses located on or near road closures (primarily on West Paisano Drive). In addition, the Catholic Diocese of El Paso who is the caretaker for a historic Smelter Cemetery near the site will be consulted. Due to the potential inconvenience caused by road closures on Executive Center Boulevard, the residents in the La Calavera subdivision will be given the opportunity to stay in a hotel on the weekend of the blast event.

In addition to the agency and one-on-one stakeholder engagement and coordination meetings, a public meeting was held by the Trustee to provide an overview of the blast event. The Trust will continue to work with the City of El Paso and print / electronic media outlets to provide the community with important information related to the chimney demolition. Additional information will also be communicated via the Trust’s website at www.recastingthesmelter.com.
APPENDIX A

Brandenburg Demolition Plan
Former ASARCO Smelter Chimney Demolition
El Paso, Texas

General Project Procedure
Security Details Removed
4/5/2013
A. **Purpose**

The purpose of this document is to outline the demolition practices which will be employed during the course of the chimney demolition. This document will identify the general sequence of demolition operations, public outreach, traffic controls, dust control measures and then the measures that will be implemented after the successful felling of the two chimneys.

Brandenburg Industrial Service Company (Brandenburg) has successfully completed numerous projects involving unique circumstances and with similar complexities to the felling of the two chimneys at the Former ASARCO Smelter. Brandenburg created the following project-specific work plan to describe how the various components of this project will be completed safely and within the scheduled time frame. Brandenburg’s full time staff of experienced professionals will coordinate all work with the Texas Custodial Trust’s Construction Manager (ERM) and The City of El Paso.
B. Location & Site MAP

1. The Former ASARCO Smelter Facility in El Paso, Texas

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C. Contract Documents and Specifications

All work is to be performed in accordance with the Project Contract, as well as all local, state and federal regulations.

D. Project Team Contact Information

1. Owner:
   Texas Custodial Trust
   2301 W. Paisano Drive
   El Paso, Texas
   Roberto Puga
   Trustee
   T 714.388.1800 / F 714.388.1839
   Email: rpuga@projectnavigator.com

2. Construction Manager:
   Environmental Resources Management Southwest, Inc. (ERM)
   15810 Park Ten Place
   Houston, Texas 77084
   Amy McDonald – Project Manager
   Phone: (281) 600-1000 | Fax: (281) 600-1001
   Email: Amy.McDonald@erm.com
3. Contractor:

**Brandenburg Industrial Service Company**

2625 South Loomis

Chicago, IL 60608

Anthony Guarnero – Project Manager

Phone: (312) 287-8813 | Fax: (312) 326-5055

Email: guaant@brandenburg.com

Project Superintendent: Robert Sosa

Phone: (312) 287-8821

Email: sosrob@brandenburg.com

Safety Manager: Andy Youpel

Phone: (312) 287-8913

Email: youand@brandenburg.com

4. Subcontractor:

**Dykon Explosive Demolition Corp.** – Explosive Contractor

1202 West 36th Street North

Tulsa, Oklahoma 74127

Owner – Jim Redyke

Phone: (918) 740-3425

Email: jim@dykon-explosivedemolition.com

E. Space Requirements / Setup / Work area

1. The current work area shall be identified as the Former ASARCO Smelter site property located between Interstate 10 and West Paisano Drive, as shown in Appendix 1. Currently the site security is being handled by the owner, but once explosives arrive on site, all security measures shall be controlled by Brandenburg and the Blaster. At that time, access to the site will be limited to only authorized personnel and security.

2. During the morning of the explosive demolition, Brandenburg will request from TxDOT and the City of El Paso, temporary road closures which will allow the safe use of explosives for the felling of the chimneys as outlined in Appendix 2. All permits will be obtained by Brandenburg.

3. Once the explosive demolition is complete, surrounding roadways will be re-opened upon inspection and clearance from Brandenburg and the Blaster.
F. **General Information**

1. Pre-Demolition Surveys to be completed (Appendix 3)
   - Asbestos Survey
   - Demolition Engineering Survey
   - Utility Review and documentation
   - Pre-Existing Conditions around site boundary

2. List of required permits and notifications (Appendix 4)
   - Explosive Demolition Permit – to be issued by City of El Paso Fire Chief
   - Highway Closure
   - City Road Closure
   - FAA notifications

3. Continued coordination with (Appendix 5)
   - City of El Paso
   - International Boundary & Water Commission
   - US Border Patrol
   - University of Texas El Paso
   - City of Juarez
   - TxDOT
   - FAA
   - TCEQ
   - EPA
   - Railroad Companies BNSF and Union Pacific

4. Demolition Date
   - April 13, 2013, near sunrise (approximately 6:30 am).

G. **Site Safety**

1. A comprehensive review of the work area and intended methodology for each task is an essential part of the safety portion of the engineering survey. Following the safety walk through, the safety portion of the engineering survey will be used to develop a site specific safety plan (Appendix 6). This plan will address the potential hazards expected to be encountered during the explosive demolition process and the appropriate safety measures required to be in place before beginning work in these areas. The site specific plan will be maintained on site throughout the duration of the explosive demolition project.

2. A hazard assessment will take place before beginning work. This assessment is documented as part of the engineering survey. Potential exposure to any hazards along with control methods can be found in the engineering survey. The Safety Manager will review activities that may result in employee exposure to certain hazards and recommend hazard control methods. Brandenburg monitors hazard control methods including personal protective equipment (PPE) to assess its effectiveness and applicability.
3. Brandenburg will conduct and document daily safety meetings.

4. The Brandenburg Emergency Contacts for the site will be Robert Sosa (primary) and Anthony Guarnero (secondary). See Section D.3. for contact information.

H. Traffic Control

Brandenburg will work with TxDOT, the City of El Paso Transportation Department, and El Paso Police Department to implement a traffic control plan. In general, portions of Interstate 10, West Paisano Drive and Executive Center Blvd will be closed before and after the blast.

All closures and permitting shall be approved prior to the day of the explosive demolition. Appendix 2 includes a copy of the road closure plan and stages of road opening/closures.

I. General Sequence

Major tasks associated with this project will generally proceed in the following sequence according to the project schedule (Appendix 7). Some tasks will occur throughout the project.

1. Environmental Control
   - The removal of accumulated materials within the chimneys
     a. Vacuum gross dust from the annulus base of the 828 ft chimney
     b. Removal of fiberglass insulation material located within the 828 ft chimney.
     c. Removal of gross dust from the bottom interior of the 612 ft chimney.
   - Installation of Dust Control Measures
     a. Construct berms on each side of the chimneys. These berms are designed to deflect debris and dust resulting from the chimney demolition. Attached is a sketch illustrating these berms.
     b. A geotextile fabric will be installed throughout the fall zones over in place site soils.
     c. Each fall zone with be covered with imported fill. Said fill will be used to absorb the chimney felling vibrations, as well as provide a layer of protective cover to reduce the potential for existing site soils to become airborne.
During the installation of the imported fill, Brandenburg will apply a dirt binder to the new material to bond this new material together. This material is commercially called Gorilla-Snot, which is a “high performance, environmentally-safe, low cost acrylic copolymer. Per the manufacturer, when applied to soils or sands, it will penetrate and coat the surface. Upon drying, Gorilla-Snot forms a water-proof, UV-resistant, solid bond which binds the soil particles which is used to bond loose site material together to prevent the emissions of dust”. More information about this product can be found at www.soilworks.com. The MSDS for Gorilla-Snot is included in Attachment 6.

Brandenburg will utilize 21 (pending design finalization) separate water misting units throughout the fall zones. Appendix 8 illustrates the locations. Misters will be located on both sides of each chimney fall zones as well as at the ends. These systems are specifically designed to capture emitted dust with the water mist and forcing that particle to immediately fall to grade. The system will not eliminate dust, but the intent is to reduce the release of dust from the demolition. The misting equipment will also use Zalta™ DS21-120 Dust Suppressant diluted at a rate of 1 part to 1000 parts water which is designed to enhance the removal of dust in the air. The MSDS for Zalta™ DS21-120 Dust Suppressant is included in Attachment 6 with a case history showing its effectiveness at controlling dust from a crusher in a mine.

The water mist system will be started 15-20 minutes before the start of demolition, and it is planned to operate for about 15 minutes after the chimneys have made impact with ground surface. Most of the water from the mist system is expected to be absorbed by dry soil and chimney debris, but there may be some ponding of water into onsite sumps. The sumps are part of the storm water management system at site. The chimney demolition work area is located within the site storm water capture system.

d. Brandenburg will construct and install debris/dust covers over several hundred feet of the water canal located just west of the chimney fall zones (Appendix 9).

e. Geotextile fabric with a chain link fencing support will be installed over the flue openings. The covering of these openings will seal off and trap debris and dust from escaping from these areas.

f. Installation of steel Conex boxes directly behind each chimney as a “backstop”. This boxes as well as the berm constructed behind them will act similarly as the side berms of each chimney. These will force and deflect fly material immediately after the chimneys start to fall.
g. It shall be noted that the Trust will install multiple dust monitoring systems throughout the work area during the time of the explosive demolition.

- **Vibration Control.**
  
  a. As noted in the previous section detailing the dust suppression, the installation of the imported fill, dirt binder and geo-fabric shall also serve as a form of vibration control.
  
  b. Despite the work site being relatively far from any public structures, Brandenburg will conduct a pre and post vibration study of the chimney demolition (Appendix 3D). The pre-demolition vibration study assessed vibration from each chimney making impact with the ground separately. This analysis is appropriate since the explosion at the 828’ Chimney will be detonated about 8 seconds after detonation at the 612’ Chimney. The study indicates that structures within a half-mile radius should not be damaged by the chimney demolitions. Multiple seismographs will be installed on site as well as off site to capture vibration data effects resulting from chimney demolition. Immediately after the explosive demolition, a verbal reading will be issued, then followed by a formal report.

2. **Utility Work/Verification**

- Prior to the date of the explosive demolition, Brandenburg will relocate the existing 6-inch potable water valve located on the northwest side of the north chimney to approximately 10-feet from the west perimeter fence. Brandenburg will excavate and bury approximately 200-feet of new PVC and tie into the existing line supplying the service pumps.

- Three days prior to the explosive demolition (April 10th), Brandenburg will disconnect the FAA warning light systems on each of the chimneys. Brandenburg will coordinate this effort with the local and regional FAA authorizes prior to any disconnection.

- As a result of the fall zone being near a known above grade natural gas service, Brandenburg will contact the local gas provider and pre-inspected said metering station. Brandenburg will also build a safety berm in front of said service to protect it from debris resulting from said work. During the explosive demolition event, Brandenburg will have gas service technicians available at the site, in the event any equipment is damaged.
3. Security
   • As noted previously in this plan, existing site security will be utilized until explosives arrive on site. Due to security concerns, the date and time shall remain known to only authorized personnel. Once explosives are on site, off-duty armed El Paso police officers will be used to secure the work site during off-work hours.

4. Pre-Demolition work
   • Prior to the date of the explosive demolition, Brandenburg will prepare the chimneys for the blast. Said work includes:
     a. Drilling holes for loading of explosives; and
     b. Creating minor opening within the chimney

5. E. Pre-Survey of General Neighboring Area
   • Prior to the date of the explosive demolition, Brandenburg will conduct a pre-explosive demolition inspection report to document pre-existing conditions on neighboring structures such as the water canal, public streets, Border Patrol cameras and public utilities (see Appendix 3D).

J. Blasting Plan
   As an attachment to this plan is the actual engineering and blasting plan provided by Dykon (Appendix 11)

K. Week of Explosive Demolition Sequence
   The following is a sequence of events for the chimney explosive demolition of the two chimneys located at ASARCO facility in El Paso, Texas. Based on weather conditions, security and as safety allows, the following times are preliminary, assuming that the explosive demolition time is 6:30 am on Saturday, April 13, 2013. *(NOTE: This version of this plan does not include confidential project team security details.)*

Thursday, April 11, 2013

7:00 am – Pre-demolition inspections of adjacent properties will begin. This will be coordinated with property owners.

1:00pm – Final Coordination meeting with Command Center representatives.

Friday, April 12, 2013

7:00 am – Pre-demolition inspections of adjacent properties will continue, if needed.
8:00 am – Final testing of Dust Suppression System.

9:00 am – Final walk (and drive) through entire areas.

4:00 pm – Final safety meeting with Brandenburg’s Crew and assignment of security details for Brandenburg Staff.

Saturday, April 13, 2013

5:00 am – Command Post will be opened. The planned location of the command post is on the south-side of Executive Center Boulevard as noted on the figure in Appendix 2.

A tent with seating will be set up to allow invited guests with special identification passes to view the chimney demolition. These guests will not be allowed access to the Command Post area without proper credentials.

Full freeway closure (hard stop) in both directions shall take place, stopping all traffic on Interstate 10. Attenuator Trucks, Street Sweepers and Police or Highway escort will be positioned on the shoulder of each direction of Interstate 10. Two additional security posts as shown on the drawing will be placed by Brandenburg, intermediately on the freeway.

5:30 am – Barricades will be installed for the closure of West Paisano Drive on both the East Bound and West Bound Lanes. This closure is critical in controlling the “Safe Zone” of the project. The only personnel allowed in the “Safe Zone” will be Trust, Brandenburg, ERM and Dykon employees with an Authorized Badge for the event which will be provided by Brandenburg.

6:00 am – Barricading of entrance and exit ramps shall take place, as well as detour signs as noted in the detailed plan. Locations will be at the University Drive and Executive Center Boulevard Areas. At this time, the El Paso Police Department will mobilize to their known and assigned posts at each of the road closures.

6:28 am – Final security check of “Safe Zone” from Command Post will be verified.

6:30 am – Felling of Chimneys shall take place. The 612’ Chimney blast will occur first, and the 828’ Chimney blast will occur about 8 seconds later. This delay is to reduce the potential of the chimneys making ground impact at the same time. There may be as much as a 10 second delay after explosive detonation before each structure starts to fall, then each structure will collapse within approximately 20 seconds after initiation of the fall.
Approximately 6:35 am – Dykon will inspect the debris pile and issue and “All Clear”. Brandenburg crews will begin the dust cleanup operations and removal of any previously placed property protections. Once inspection of each closed road is finalized, road closures and barricades will be removed. The order of operation will be Interstate 10, West Paisano Drive, and then Executive Center Boulevard.

Approximately 6:40 am – Clearance from Blaster and Command Post should be received. Sweepers will be released to Interstate 10, Executive Center Boulevard, and West Paisano Drive for clearing. Upon release of the all-clear, the public utilities, IBWC and railroad personnel will be allowed in the safe zone to check their equipment. The site will be open only to working personnel.

Approximately 7:15 am – Interstate 10 will be re-opened.

Approximately 8:00 am – All barricades will be removed from Executive Center Blvd.

Approximately 9:00 am – All barricades will be removed from West Paisano.

L. Disclaimer
Consistent with controlling contract documents and contractor’s obligations to comply with applicable law, if site conditions warrant, this plan can be so modified consistent with those requirements.
Appendix 1
Work Area Extents
Appendix 2
Road Closure Design
Location: Paisano Dr near Downtown
Location: Near Sunland Park Drive and I-10
Location: Near W Paisano Dr and McNutt Rd
Location: I-10W near Downtown
Location: W Paisano Dr at Ruhlen Ct
I - 10 WEST CLOSURE

Location: I-10W near N Cotton St
TRAFFIC WILL BE STOPPED HERE EXITING MESA OR BEFORE

Location: I-10 W near W Schuster Ave

<table>
<thead>
<tr>
<th>POSTED SPEED (MPH)</th>
<th>X Sign Spacing (Meters)</th>
<th>X Signs Spacing (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 or less</td>
<td>40</td>
<td>120</td>
</tr>
<tr>
<td>35</td>
<td>50</td>
<td>160</td>
</tr>
<tr>
<td>40</td>
<td>75</td>
<td>240</td>
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<tr>
<td>45</td>
<td>400</td>
<td>320</td>
</tr>
<tr>
<td>50</td>
<td>120</td>
<td>400</td>
</tr>
<tr>
<td>55</td>
<td>150</td>
<td>500</td>
</tr>
</tbody>
</table>
I - 10 EAST CLOSURE

TRAFFIC WILL BE STOPPED HERE

NO TRAFFIC GOING EAST ON I-10

Location: I-10E approaching and at Executive Center Blvd
I-10 WEST ENTRANCE CLOSURE

TO THRU TRAFFIC

DETOUR

L - LEFT
R - RIGHT
C - CENTER
LANE CLOSED

DETOUR
L - LEFT
R - RIGHT

ROAD CLOSED

ARROW BOARD

MESSAGE BOARD

ROAD CLOSED TO THRU TRAFFIC

DETOUR L - LEFT
R - RIGHT
RAMP CLOSED

Location: I-10W near W Schuster

POSTED SPEED
(MPH)

30 or less
35
40
45
50
55

X Sign Spacing (Meters)

40
50
75
400
120
150

X Signs Spacing Feet

120
160
240
320
400
500

SALES & RENTALS
WWW.TCS-EP.COM

Specialist Traffic Specialist
(E) dan@tcs-ep.com
(F) 915.921.1647
(C) 915.226.5661
(O) 915.921.0300

SALES & RENTALS
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(C) 915.226.5661
(O) 915.921.0300
Appendix 3
Pre-Demolition Surveys

TO BE PROVIDED AS COMPLETED
Pre-Existing Conditions of Surrounding Site

Vibration predictive calculations were conducted on the use of explosives to demolish the Former ASARCO Smelter chimneys and on the resulting impact of the chimneys hitting the ground. These calculations indicate that vibration from demolition of the chimneys should have no impact to structures on site or off site. To provide post-demolition support for the modeling results, the pre-existing condition of structures adjacent to the site will be documented prior to demolition activities with two separate, independent inspections.

- During the week of March 25, 2013, a Brandenburg field engineer will record anomalies in a log book and document anomalies with photographs for structures near the property boundary to document pre-existing conditions. Some of the structures included in this survey will be:
  - IBWC Canal
  - IBWC Maintenance Field Office
  - IBWC Dam
  - Railroad Tracks to the east and west of the site
  - Border Patrol Cameras
  - Homes on San Marcos Drive
  - Business Buildings on adjacent properties
  - Portions of West Paisano Drive

- On April 11-12, 2013, Protec (Brandenburg’s vibration consultant) will conduct a separate pre-existing condition survey. Protec will use a log book and video and/or photographs to document pre-existing conditions on the same structures surveyed by Brandenburg. Since the inspections will be conducted independently, the findings may be different.

After demolition of the chimneys is completed, Brandenburg will conduct a post-demolition survey of the same facilities surveyed for pre-existing conditions. Any anomalies from either of the two pre-existing condition surveys will be re-photographed, and any new anomalies will be documented in a log book and photographed. If any post-demolition damage is reported, the damage will be compared with findings in the pre-existing conditions documentation.
Appendix 4
Permits and Notifications

TO BE PROVIDED AS COMPLETED AND ISSUED
Appendix 5
Stakeholder List

INTERNAL DOCUMENT ONLY
Appendix 6
Project-Specific Health and Safety Plan

INTERNAL DOCUMENT ONLY
MATERIAL SAFETY DATA SHEET

SECTION 1 - MATERIAL IDENTIFICATION

PRODUCT NAME: GORILLA-SNOT*

*GORILLA-SNOT is a registered trademark of Soilworks, LLC.

MANUFACTURER:
Soilworks, LLC.
2450 South Gilbert Road, Suite 210
Chandler, Arizona 85286-1595 USA
www.soilworks.com

TELEPHONE NUMBER:
800-545-5420
www.Soilworks.com

REVISION DATE:
January 2007 (supersedes March 2006)

PHYSICAL FORM:
Mobile liquid

COLOR:
Milky White (transparent once cured)

ODOR:
Mild / Slight (no odor once cured)

C.A.S. CHEMICAL NAME:
Mixture

SYNONYMS:
Soil stabilizer, soil stabilization agent, soil solidifier, soil amendment, soil additive, soil crusting agent, dust control agent, dust inhibitor, dust palliative, dust suppressant, dust retardant

CHEMICAL FAMILY:
Vinyl Copolymer Emulsion

INTENDED USE:
Soil stabilization, soil solidification, fugitive dust control, dust suppression, dust abatement, tackifier, dust abatement, PM10 and PM2.5 air quality control and erosion control

SECTION 2 - INGREDIENTS

<table>
<thead>
<tr>
<th>%</th>
<th>CAS Number</th>
<th>Chemical Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>20-60</td>
<td>Proprietary</td>
</tr>
<tr>
<td>2.</td>
<td>80-40</td>
<td>7732-18-5</td>
</tr>
</tbody>
</table>

SECTION 3 - HEALTH HAZARDS

ROUTES OF ENTRY:
Eye Contact, Skin Contact, Ingestion and Inhalation

SIGNS AND SYMPTOMS OF ACUTE EXPOSURE:
Eyes: Direct contact with this material may cause eye irritation including lachrymation (tearing).
Inhalation: Inhalation of vapor or aerosol may cause irritation to the respiratory tract (nose, throat, and lungs).
Skin: Contact may cause skin irritation.
Ingestion: No hazard in normal industrial use.

SIGNS AND SYMPTOMS OF CHRONIC EXPOSURE:
Prolonged or repeated contact with skin may cause irritation and dermatitis (inflammation).

CARCINOGENICITY:
This material does not contain 0.1% or more of any chemical listed by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or regulated by the Occupational Safety and Health Administration (OSHA) as a carcinogen.

SECTION 4 - FIRST AID

EYE CONTACT:
Flush eyes with clean water for at least 15 minutes. Get immediate medical attention.

SKIN CONTACT:
Remove contaminated clothing and shoes. Wash affected area with soap and water. Get medical attention if irritation develops or persists.

INHALATION:
Move patient to fresh air. If breathing has stopped or is labored give assisted respiration (e.g. mouth-to-mouth). Supplemental oxygen may be indicated. Seek medical advice.

INGESTION:
Give the victim one or two glasses of water or milk to drink. Get immediate medical attention. Never give anything by mouth to an unconscious person.
SECTION 5 - FIRE AND EXPLOSION DATA

FLASH POINT (closed cup) Not applicable
UPPER EXPLOSION LIMIT (UEL) Not applicable
LOWER EXPLOSION LIMIT (LEL) Not applicable
AUTOIGNITION TEMPERATURE Not applicable
FIRE HAZARD CLASSIFICATION (OSHA/NFPA) Non-Combustible

EXTINGUISHING MEDIA
Product does not burn. The product will only burn after the water it contains is driven off. For dry polymer use carbon dioxide, foam, dry chemical or water fog to extinguish fire. Aqueous solution is not flammable.

FIRE FIGHTING EQUIPMENT
Wear self-contained breathing apparatus (SCBA) and full fire-fighting protective clothing. Thoroughly decontaminate all protective equipment after use.

FIRE FIGHTING INSTRUCTIONS
Containers of this material may build up pressure if exposed to heat (fire). Use water spray to cool fire-exposed containers.

FIRE AND EXPLOSION HAZARDS
This material will not burn unless it is evaporated to dryness. Closed containers may rupture when exposed to extreme heat.

HAZARDOUS COMBUSTION PRODUCTS
When dried polymer burns, water (H2O), carbon dioxide (CO2), carbon monoxide (CO) and smoke are produced.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

CONTAINMENT TECHNIQUES (Removal of ignition sources, diking etc)
Stop the leak, if possible. Ventilate the space involved.

CLEAN-UP PROCEDURES
Wear suitable protective equipment. If recovery is not feasible, admix with dry soil, sand or non-reactive absorbent and place in an appropriate chemical waste container. Prevent spilled material from entering sanitary sewers, storm sewers, drainage systems and from entering bodies of water or ditches that lead to waterways. Transfer to containers by suction, preparatory for later disposal. Place in metal containers for recovery or disposal. Flush area with water spray. Wash contaminated property (e.g., automobiles) quickly before the material dries. For large spills, recover spilled material with a vacuum truck.

OTHER EMERGENCY ADVICE
Spilled polymer emulsion is very slippery. Use care to avoid falls. A film will form on drying. Remove saturated clothing and wash contacted skin area with soap and water. Product imparts a milky white color to contaminated waters. Foaming may result. Sewage treatment plants may not be able to remove the white color imparted to the water.

SECTION 7 - HANDLING AND STORAGE

STORAGE
Keep from freezing. Store in a dry area. Keep containers closed when not in use to minimize contact with atmospheric air and prevent inoculation with microorganisms.

HANDLING
Use only in well-ventilated areas. Avoid contact with eyes. Avoid breathing vapors. Avoid prolonged or repeated contact with skin. Wash hands thoroughly after handling and before eating or drinking.

SECTION 8 - PERSONAL PROTECTION / EXPOSURE CONTROLS

EXPOSURE GUIDELINES
There are no Occupational Safety and Health (OSHA) Permissible Exposure Limits (PEL) or American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) or Short Term Exposure Limits (STEL) established for the component(s) of this product.

EYE PROTECTION
Chemical safety glasses.

HAND PROTECTION
Rubber Gloves. The breakthrough time of the selected glove(s) must be greater than the intended use period.

RESPIRATORY PROTECTION
Not required under normal use.

PROTECTIVE CLOTHING
No specific recommendation.

ENGINEERING CONTROLS
Good general ventilation should be sufficient to control airborne levels of irritating vapors.
SECTION 9 - TYPICAL PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Form</td>
<td>liquid</td>
</tr>
<tr>
<td>Color</td>
<td>Milky White (transparent once cured)</td>
</tr>
<tr>
<td>Odor</td>
<td>Mild / Slight (no odor once cured)</td>
</tr>
<tr>
<td>pH</td>
<td>4-9</td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>&lt; 1 (BuAc=1)</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>&gt; 1 (Air = 1)</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>&gt;100.00°C (&gt;212.00°F)</td>
</tr>
<tr>
<td>Freezing Point</td>
<td>&lt;0°C (&lt;32°F)</td>
</tr>
<tr>
<td>Solubility in Water</td>
<td>Completely (100%) (until cured)</td>
</tr>
<tr>
<td>Specific Gravity (Water = 1)</td>
<td>1.02-1.10</td>
</tr>
</tbody>
</table>

SECTION 10 - STABILITY AND REACTIVITY

Stability
- Stable at ambient temperatures. Coagulation may occur following freezing, thawing or boiling.

Incompatibility (Materials to Avoid)
- No incompatibilities have been identified.

Hazardous Decomposition Products
- Thermal decomposition may form: Acetic acid and Acrolein. Thermal decomposition may produce various hydrocarbons and irritating, acrid vapors.

Hazardous Polymerization
- Will not occur.

Conditions to Avoid
- Freezing temperatures (until cured).

SECTION 11 - TOXICOLOGICAL PROPERTIES

Acute Eye Toxicity
- No information is available.

Acute Oral Toxicity
- No information is available.

Acute Skin Toxicity
- No information is available.

Acute Inhalation Toxicity
- No information is available.

Chronic/Carcinogenicity
- This material does not contain 0.1% or more of any chemical listed by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or regulated by the Occupational Safety and Health Administration (OSHA) as a carcinogen.

SECTION 12 - ECOLOGICAL INFORMATION

Ecotoxicity
<table>
<thead>
<tr>
<th>Common Name</th>
<th>Species</th>
<th>Test</th>
<th>Result</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Algae</td>
<td>Raphidocelus Subcapitata</td>
<td>96-hr chronic LC50</td>
<td>&gt;1,000</td>
<td>Undiluted</td>
</tr>
<tr>
<td>Fathead Minnow</td>
<td>Pimephales Promelas</td>
<td>96-hr acute LC50</td>
<td>&gt;1,208</td>
<td>Undiluted</td>
</tr>
<tr>
<td>Rainbow Trout</td>
<td>Oncorhynchus Mykiss</td>
<td>96-hr acute LC50</td>
<td>&gt;1,000</td>
<td>Undiluted</td>
</tr>
</tbody>
</table>

Environmental Fate
- No data is available.

SECTION 13 - DISPOSAL CONSIDERATIONS

Waste Disposal Method
- This material is not a RCRA hazardous waste. Disposal of this material is not regulated under RCRA. Consult federal, state and local regulations to ensure that this material and its containers, if discarded, is disposed of in compliance with all regulatory requirements. NOTE: As supplied or diluted, product material (foam included), when splashed on automobiles or other personal property, is difficult to remove if allowed to dry.

RCRA Hazard Class
- This material is not a RCRA hazardous waste. When discarded in its purchased form, this material would not be regulated as a RCRA Hazardous waste under 40 CFR 261.
SECTION 14 - TRANSPORT INFORMATION

DOT NON-BULK SHIPPING NAME
Refer to Bill of Lading - Not DOT Regulated // Keep From Freezing // Not dangerous goods

DOT BULK SHIPPING NAME
Refer to Bill of Lading.

IMO SHIPPING DATA
Refer to Bill of Lading.

ICAO/IATA SHIPPING DATA
Refer to Bill of Lading - Not IATA Regulated // Keep From Freezing // Not dangerous goods

CFR
Not Regulated // Keep From Freezing // Not dangerous goods

IMDG
Not Regulated // Keep From Freezing // Not dangerous goods

CTC
Not Regulated // Keep From Freezing // Not dangerous goods

SECTION 15 - REGULATORY INFORMATION

TSCA SECTION 8(b) INVENTORY STATUS
All components are included in the EPA Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

TSCA SECTION 12(b) EXPORT NOTIFICATION
This material does not contain any components that are subject to the U.S. Toxic Substances Control Act (TSCA) Section 12 (b) Export Notification requirements.

This material is not classified as hazardous under the criteria of the U.S. Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR 1910.1200

EPA SARA Title III Section 304 CERCLA
Reportable quantities have not been established for any of this material’s components.

EPA SARA Title III Section 311/312 HAZARD COMMUNICATION STANDARD (HCS)
This material is not a hazardous chemical.

EPA SARA Title III Section 313 TOXIC CHEMICAL LIST (TCL)
This product does not contain Section 313 Reportable Ingredients.

CANADIAN INVENTORY STATUS
All components of this material are listed on the Canadian Domestic Substances List (DSL)

CANADIAN WHMIS
This material is not classified as a controlled product under the Canadian Workplace Hazardous Material Information System.

ADDITIONAL CANADIAN REGULATORY INFORMATION
This product does not contain a substance present on the WHMIS Ingredient Disclosure List (IDL) which is at or above the specified concentration limit.

EUROPEAN INVENTORY STATUS (EINECS)
The polymer portion of this product is manufactured from reactants which are listed on EINECS and meets the EINECS definition of an exempt polymer.

AICS (Australia)
Included on inventory

ENCS (Japan)
Included on inventory

ECL (South Korea)
Included on inventory

SEPA (China)
Included on inventory

SECTION 16 – OTHER INFORMATION

HMIS and NFPA Classification

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
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<tbody>
<tr>
<td>Health</td>
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<tr>
<td>Flammability</td>
<td>0</td>
</tr>
<tr>
<td>Reactivity</td>
<td>0</td>
</tr>
<tr>
<td>Special Hazard</td>
<td>0</td>
</tr>
</tbody>
</table>
Zalta™ DS21-120 DUST SUPPRESSANT
™ Trademark, Ashland or its subsidiaries, registered in various countries

1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

<table>
<thead>
<tr>
<th>Ashland</th>
<th>Regulatory Information Number</th>
<th>1-800-325-3751</th>
</tr>
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<tbody>
<tr>
<td>P.O. Box 2219</td>
<td>Telephone</td>
<td>614-790-3333</td>
</tr>
<tr>
<td>Columbus, OH 43216</td>
<td>Emergency telephone number</td>
<td>1-800-ASHLAND (1-800-274-5263)</td>
</tr>
</tbody>
</table>

Product name: Zalta™ DS21-120 DUST SUPPRESSANT
™ Trademark, Ashland or its subsidiaries, registered in various countries

Product code: 777308
Product Use Description: No data

2. HAZARDS IDENTIFICATION

Emergency Overview

Appearance: liquid, colourless

WARNING! MAY AFFECT THE CENTRAL NERVOUS SYSTEM CAUSING DIZZINESS, HEADACHE OR NAUSEA. CAUSES EYE IRRITATION. MAY CAUSE SKIN AND RESPIRATORY TRACT IRRITATION. MAY BE HARMFUL IF SWALLOWED.

Potential Health Effects

Exposure routes
Inhalation, Skin absorption, Skin contact, Eye Contact, Ingestion

Eye contact
Can cause severe eye irritation. Symptoms include stinging, tearing, redness, and swelling of eyes. Can injure eye tissue.

Skin contact
Can cause skin irritation. Symptoms may include redness and burning of skin, and other skin damage.

Ingestion
Swallowing small amounts of this material during normal handling is not likely to cause harmful effects. Swallowing large amounts may be harmful.

**Inhalation**

Breathing of vapor or mist is possible. Breathing small amounts of this material during normal handling is not likely to cause harmful effects. Breathing large amounts may be harmful. Symptoms are not expected at air concentrations below the recommended exposure limits, if applicable (see Section 8.).

**Aggravated Medical Condition**

Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: lung (for example, asthma-like conditions), Upper respiratory tract, Skin, Kidney

**Symptoms**

Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include: stomach or intestinal upset (nausea, vomiting, diarrhea), irritation (nose, throat, airways), central nervous system depression (dizziness, drowsiness, weakness, fatigue, nausea, headache, unconsciousness), narcosis (dazed or sluggish feeling)

**Target Organs**

Overexposure to this material (or its components) has been suggested as a cause of the following effects in laboratory animals: mild, reversible liver effects, kidney damage

**Carcinogenicity**

This material is not listed as a carcinogen by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or the Occupational Safety and Health Administration (OSHA).

**Reproductive hazard**

Based on the available information, risk to the fetus from maternal exposure to this material cannot be assessed.

**Other information**

Propylene glycol may be absorbed in potentially harmful amounts when applied in large quantities to severe burns (second or third degree) over large areas of the body as part of a cream or other topical application. Absorption under such circumstances can elevate serum osmolality and may result in osmotic shock.
3. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Hazardous Components</th>
<th>CAS-No.</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALCOHOLS, C11-14-ISO-, C13-RICH, ETHOXYLATED</td>
<td>78330-21-9</td>
<td>&gt;=15-&lt;20%</td>
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<tr>
<td>DIPROPYLENE GLYCOL MONOMETHYL ETHER</td>
<td>34590-94-8</td>
<td>&gt;=5-&lt;10%</td>
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<tr>
<td>DIOCTYL SODIUM SULFOSUCCINATE</td>
<td>577-11-7</td>
<td>&gt;=1.5-&lt;5%</td>
</tr>
<tr>
<td>ALKYL GLYCOL</td>
<td>254504001-5231</td>
<td>&gt;=1-&lt;1.5%</td>
</tr>
</tbody>
</table>

4. FIRST AID MEASURES

Eyes
If symptoms develop, immediately move individual away from exposure and into fresh air. Flush eyes gently with water for at least 15 minutes while holding eyelids apart; seek immediate medical attention.

Skin
Remove contaminated clothing. Flush exposed area with large amounts of water. If skin is damaged, seek immediate medical attention. If skin is not damaged and symptoms persist, seek medical attention. Launder clothing before reuse.

Ingestion
Seek medical attention. If individual is drowsy or unconscious, do not give anything by mouth; place individual on the left side with the head down. Contact a physician, medical facility, or poison control center for advice about whether to induce vomiting. If possible, do not leave individual unattended.

Inhalation
If symptoms develop, move individual away from exposure and into fresh air. If symptoms persist, seek medical attention. If breathing is difficult, administer oxygen. Keep person warm and quiet; seek immediate medical attention.

Notes to physician
Hazards: No information available.
Treatment: No information available.
5. FIRE-FIGHTING MEASURES

**Suitable extinguishing media**
- Dry chemical, Carbon dioxide (CO2), Water spray

**Hazardous combustion products**
- carbon dioxide and carbon monoxide, Hydrocarbons, sulfur oxides, organic compounds

**Precautions for fire-fighting**
- Wear full firefighting turn-out gear (full Bunker gear), and respiratory protection (SCBA). Use water spray to cool fire exposed containers and structures until fire is out if it can be done with minimal risk. Avoid spreading burning material with water used for cooling purposes.

**NFPA Flammable and Combustible Liquids Classification**
- Combustible Liquid Class IIIB

6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**
- For personal protection see section 8. Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed.

**Environmental precautions**
- Prevent spreading over a wide area (e.g. by containment or oil barriers). Do not let product enter drains. Do not flush into surface water or sanitary sewer system.

**Methods for cleaning up**
- Keep in suitable, closed containers for disposal. Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust).

**Other information**
- Comply with all applicable federal, state, and local regulations.

7. HANDLING AND STORAGE

**Handling**
Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed.

Storage
Store in a cool, dry, ventilated area. Keep from freezing. Keep container closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

<table>
<thead>
<tr>
<th>DIPROPYLENE GLYCOL MONOMETHYL ETHER</th>
<th>34590-94-8</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIOSH Recommended exposure limit (REL):</td>
<td>100 ppm</td>
</tr>
<tr>
<td>NIOSH Recommended exposure limit (REL):</td>
<td>600 mg/m³</td>
</tr>
<tr>
<td>NIOSH Short term exposure limit</td>
<td>150 ppm</td>
</tr>
<tr>
<td>NIOSH Short term exposure limit</td>
<td>900 mg/m³</td>
</tr>
<tr>
<td>OSHA Z1 Permissible exposure limit</td>
<td>100 ppm</td>
</tr>
<tr>
<td>OSHA Z1 Permissible exposure limit</td>
<td>600 mg/m³</td>
</tr>
<tr>
<td>ACGIH time weighted average</td>
<td>100 ppm</td>
</tr>
<tr>
<td>ACGIH Short term exposure limit</td>
<td>150 ppm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ALKYL GLYCOL</th>
<th>254504001-5231</th>
</tr>
</thead>
<tbody>
<tr>
<td>WEEL time weighted average</td>
<td>10 mg/m³ Aerosol.</td>
</tr>
</tbody>
</table>

General advice
These recommendations provide general guidance for handling this product. Personal protective equipment should be selected for individual applications and should consider factors which affect exposure potential, such as handling practices, chemical concentrations and ventilation. It is ultimately the responsibility of the employer to follow regulatory guidelines established by local authorities.

Exposure controls
Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below exposure guidelines (if applicable) or below levels that cause known, suspected or apparent adverse effects.

Eye protection
Wear chemical splash goggles when there is the potential for exposure of the eyes to liquid, vapor or mist. Maintain eye wash station near work area.

Skin and body protection
Wear normal work clothing including long pants, long-sleeved shirts and foot covering to prevent direct contact of the product with the skin. Launder clothing before reuse. If skin irritation develops, contact your facility health and safety professional or your local safety equipment supplier to determine the proper personal protective equipment for your use.

Wear resistant gloves (consult your safety equipment supplier). Discard gloves that show tears, pinholes, or signs of wear.

Respiratory protection

A NIOSH-approved air-purifying respirator with an appropriate cartridge and/or filter may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits (if applicable) or if overexposure has otherwise been determined. Protection provided by air-purifying respirators is limited. Use a positive pressure, air-supplied respirator if there is any potential for uncontrolled release, exposure levels are not known or any other circumstances where an air-purifying respirator may not provide adequate protection.

### 9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Physical state</th>
<th>liquid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>no data available</td>
</tr>
<tr>
<td>Colour</td>
<td>colourless</td>
</tr>
<tr>
<td>Odour</td>
<td>no data available</td>
</tr>
<tr>
<td>Boiling point/boiling range</td>
<td>$212 , ^\circ F / 100 , ^\circ C @ 760.00 , mmHg$</td>
</tr>
<tr>
<td>Melting point/range</td>
<td>$28.00 , ^\circ F / -2.22 , ^\circ C$</td>
</tr>
</tbody>
</table>

| Sublimation point          | no data available |
| pH                         | 5.5 |
| Flash point                | ($>)200.1 \, ^\circ F / 93.4 \, ^\circ C$ |
| Ignition temperature       | no data available |
| Evaporation rate           | ($>)1 \, Ethyl Ether |
| Lower explosion limit/Upper explosion limit | $1.1 \, %(V) / 14 \, %(V)$ |
| Particle size              | no data available |
| Vapour pressure            | $23.333 \, hPa @ 68 \, ^\circ F / 20 \, ^\circ C$ Calculated Vapor Pressure |

Relative vapour density ($>$1 AIR=1)

| Density                    | 1.010 \, g/cm³ @ 77.00 \, ^\circ F / 25.00 \, ^\circ C |
| Bulk density               | $8.400 \, lb/gal @ 77.00 \, ^\circ F / 25.00 \, ^\circ C$ |
| Water solubility           | dispersible |
| Solubility(ies)            | no data available |
### 10. STABILITY AND REACTIVITY

**Stability**  
Stable.

**Conditions to avoid**  
None known.

**Incompatible products**  
Acids, aluminum, Bases, isocyanates, Oxygen, salts of strong bases, Strong oxidizing agents, UV light.

**Hazardous decomposition products**  
carbon dioxide and carbon monoxide, Hydrocarbons, Aldehydes, ketones, Sulphur oxides, Alcohols, dioxolanes, ethers, Organic acids

**Hazardous reactions**  
Product will not undergo hazardous polymerization.

**Thermal decomposition**  
No data

### 11. TOXICOLOGICAL INFORMATION

**Acute oral toxicity**  
ALCOHOLS, C11-14-ISO-, C13-RICH, ETHOXYLATED  
:  
LD 50  Rat:  500 - 2,000 mg/kg
Zalta™ DS21-120 DUST SUPPRESSANT
™ Trademark, Ashland or its subsidiaries, registered in various countries 777308

DIPROPYLENE GLYCOL MONOMETHYL ETHER : LD 50 Rat: 5,135 mg/kg
DIOCTYL SODIUM SULFOSUCCINATE : LD 50 Rat: > 2,000 mg/kg
 : LD 50 Mouse: 2,640 mg/kg
ALKYL GLYCOL : LD 50 Rat: 21.0 - 33.7 g/kg

**Acute inhalation toxicity**
ALCOHOLS, C11-14-ISO-, C13-RICH, ETHEROXYLATED : no data available
DIPROPYLENE GLYCOL MONOMETHYL ETHER : no data available
DIOCTYL SODIUM SULFOSUCCINATE : no data available
ALKYL GLYCOL : no data available

**Acute dermal toxicity**
ALCOHOLS, C11-14-ISO-, C13-RICH, ETHEROXYLATED : no data available
DIPROPYLENE GLYCOL MONOMETHYL ETHER : LD 50 Rabbit: 9.5 g/kg
DIOCTYL SODIUM SULFOSUCCINATE : LD 50 Rabbit: > 10 g/kg
ALKYL GLYCOL : LD 50 Rabbit: 28 g/kg

**12. ECOLOGICAL INFORMATION**

**Biodegradability**
ALCOHOLS, C11-14-ISO-, C13-RICH, ETHEROXYLATED : > 60 %
Exposure time: 28 d
Readily biodegradable

DIPROPYLENE GLYCOL MONOMETHYL ETHER : 75 %
Exposure time: 28 d
Method: OECD Test Guideline 301F

DIOCTYL SODIUM SULFOSUCCINATE : no data available
ALKYL GLYCOL : 81 %
Bioaccumulation
ALCOHOLS, C11-14-ISO-, C13-RICH, ETHOXYLATED
: no data available
DIPROPYLENE GLYCOL MONOMETHYL ETHER
: no data available
DIOCTYL SODIUM SULFOSUCCINATE
: Species: Rainbow trout, donaldson trout (Oncorhynchus mykiss)
  Exposure time: 72 h
  Dose: 0.0055 mg/l
  Bioconcentration factor (BCF): 3.78
  Method: Renewal

ALKYL GLYCOL
: no data available

Ecotoxicity effects

Toxicity to fish
: 96 h static test LC 50 Oncorhynchus mykiss (rainbow trout): 33.00 mg/l
: 96 h static test LC 50 Pimephales promelas (fathead minnow): 16.50 mg/l

Toxicity to daphnia and other aquatic invertebrates.
: 48 h static test LC 50 Daphnia magna (Water flea): 49.30 mg/l

Toxicity to algae
ALCOHOLS, C11-14-ISO-, C13-RICH, ETHOXYLATED
: no data available
DIPROPYLENE GLYCOL MONOMETHYL ETHER
: 96 h Growth inhibition Green algae (Selenastrum capricornutum): > 969.00 mg/l
DIOCTYL SODIUM SULFOSUCCINATE
: no data available
ALKYL GLYCOL
: no data available
Toxicity to bacteria
ALCOHOLS, C11-14-ISO-, C13-RICH, ETHOXYLATED: no data available
DIPROPYLENE GLYCOL MONOMETHYL ETHER: no data available
DIOCTYL SODIUM SULFOSUCCINATE: no data available
ALKYL GLYCOL: no data available

Biochemical Oxygen Demand (BOD): Biochemical oxygen demand within 5 days: 110,000 mg/l

Chemical Oxygen Demand (COD): 580,000 mg/l

Additional ecological information
ALCOHOLS, C11-14-ISO-, C13-RICH, ETHOXYLATED: no data available
DIPROPYLENE GLYCOL MONOMETHYL ETHER: no data available
DIOCTYL SODIUM SULFOSUCCINATE: no data available
ALKYL GLYCOL: no data available

13. DISPOSAL CONSIDERATIONS

Waste disposal methods
Dispose of in accordance with all applicable local, state and federal regulations.

14. TRANSPORT INFORMATION

<table>
<thead>
<tr>
<th>REGULATION</th>
<th>PROPER SHIPPING NAME</th>
<th>*HAZARD CLASS</th>
<th>SUBSIDIARY HAZARDS</th>
<th>PACKING GROUP</th>
<th>MARINE POLLUTANT / LTD. QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. DOT - ROAD</td>
<td>Not dangerous goods</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Page 10 / 13
U.S. DOT - RAIL

Not dangerous goods

U.S. DOT - INLAND WATERWAYS

Not dangerous goods

TRANSPORT CANADA - ROAD

Not dangerous goods

TRANSPORT CANADA - RAIL

Not dangerous goods

TRANSPORT CANADA - INLAND WATERWAYS

Not dangerous goods

INTERNATIONAL MARITIME DANGEROUS GOODS

Not dangerous goods

INTERNATIONAL AIR TRANSPORT ASSOCIATION - CARGO

Not dangerous goods

INTERNATIONAL AIR TRANSPORT ASSOCIATION - PASSENGER

Not dangerous goods

MEXICAN REGULATION FOR THE LAND TRANSPORT OF HAZARDOUS MATERIALS AND WASTES

Not dangerous goods

*ORM = ORM-D, CBL = COMBUSTIBLE LIQUID

Dangerous goods descriptions (if indicated above) may not reflect quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

15. REGULATORY INFORMATION

California Prop. 65
SAFETY DATA SHEET

Zalta™ DS21-120 DUST SUPPRESSANT
™ Trademark, Ashland or its subsidiaries, registered in various countries777308

WARNING! This product contains a chemical known to the State of California to cause cancer.

| ETHYLENE OXIDE
| ACETALDEHYDE
| 1,4-DIOXANE |

WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

| ETHYLENE OXIDE |

SARA Hazard Classification
Acute Health Hazard

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Notification status
US. Toxic Substances Control Act y (positive listing)
Canada. Canadian Environmental Protection Act (CEPA). y (positive listing)
Australia. Industrial Chemical (Notification and Assessment) Act y (positive listing)
New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand n (Negative listing)
Japan. Kashin-Hou Law List y (positive listing)
Korea. Toxic Chemical Control Law (TCCL) List y (positive listing)
Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act y (positive listing)
China. Inventory of Existing Chemical Substances y (positive listing)

<table>
<thead>
<tr>
<th>HMIS</th>
<th>NFPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health</td>
<td>2</td>
</tr>
<tr>
<td>Flammability</td>
<td>1</td>
</tr>
<tr>
<td>Physical hazards</td>
<td>0</td>
</tr>
<tr>
<td>Instability</td>
<td>0</td>
</tr>
<tr>
<td>Specific Hazard</td>
<td>--</td>
</tr>
</tbody>
</table>
16. OTHER INFORMATION

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This MSDS has been prepared by Ashland's Environmental Health and Safety Department (1-800-325-3751).
Ashland Dust Suppressant Protects Workers From Dust, Lead and Mechanical Faults
Zalta™ DS21-120 dust suppressant

Customer Overview:
- Segment: Mining - Zinc
- Product(s): Zalta™ DS21-120
- Location: East Coast Canada

Application Overview:
- Type: Dust suppression: Underground material handling
- Equipment: Crusher and feeders
- Capacity: 1300 tph through crusher

Existing Treatment:
Dust generated by the crusher and its feeder, as well as the feeder ahead of the skips, was initially treated with a competitor's foam surfactant. However, this product was discontinued due to interference with a downstream flotation process. Water sprays were then utilized delivering water at a rate of 5% water per ton of crushed ore.

Problem Summary:
Dust control is essential at the underground crusher and skip loading sites to maintain a healthy atmosphere for the workers as well as help ensure that their exposure to lead is minimized. If a worker's blood lead level exceeds the mine's stringent limit, the worker is relocated from the mine for two weeks until their blood lead level abates. This represents a significant loss of experienced worker time from the mine, as well as the cost of having to pay an idled worker and lost production.

A foam surfactant was initially utilized, however, it interfered with the flotation process and its use was discontinued. Subsequently, the mine resorted to water only sprays, but the high volume of water required to control the dusting produced very muddy ore. The wet ore frequently caused dangerous shutter faults by preventing the skip doors from closing properly.

Customer Objectives:
- Find a dust suppressant that effectively removes harmful dust from work areas but does not impact the downstream flotation process.
- Minimize worker exposure to lead and the costs associated with health concerns, idled workers and lost production.
- Prevent dangerous mechanical issues with the skips due to excessive moisture being added.

Ashland Solution:
The mine requested Ashland's help in solving their dust problems. After a survey of the site and analysis of the problems, Zalta™ DS21-120 dust suppressant was recommended. The mine tested a sample of this product and determined it would not affect the flotation process.

The Zalta DS21-120 was diluted 1 part to 1000 parts water and this solution was sprayed onto the dust generating areas of the crusher and feeders. This treatment resulted in dust levels being reduced by 84%. The average worker blood lead level dropped by 50% after the Zalta DS21-120 treatment was implemented. Only 0.75% moisture was being added to the ore, which did not make it muddy or cause shutter faults.

Customer Benefits:
- Significantly reduced worker exposure to dust.
- Significantly reduced worker exposure to lead as measured by worker blood lead levels reduced by 50%
- Reduced idled worker time by protecting them from excessive accumulation of lead in their bodies.

Continued on page 2.
- 85% less water was required for dust control eliminating the need to handle muddy ore and prevented the occurrence of dangerous skip faults.
- No adverse affects on the downstream flotation process.

**Conclusion:**
Ashland provided a dust control treatment program that was able to protect the mine workers from exposure to respirable dust and lead, while not disrupting the flotation process. This program allowed much less water to be used to control dust, eliminating handling, mechanical and safety issues caused by wet ore.

---

**Dust Levels**

(1200:1 during gravimetric sampling)

Dust level abatement with Zalta DS21-120 treatment.
Appendix 7
Project Schedule

INTERNAL DOCUMENT ONLY
Appendix 8
Water Misting System Design
Dust Suppression Layout for Asarco Stack Chimney Demolition

All Rain for Rent equipment (water storage tanks, pumps, and piping) will be delivered onsite the week prior to the demolition no later than April 5th. All Company Wrench equipment will arrive onsite on Monday April 8th to be unloaded and staged near the location of use. Three Company Wrench employees will also arrive onsite Monday April 8th, will attend the safety meeting, and will begin laying out and placing equipment. Four frac tanks will be used and three 6 inch diesel pumps will be used to supply water throughout the piping system. System A and C will use 6-inch aluminum pipe and System B will use 8-inch aluminum pipe to provide the proper water supply needed over a long run. Piping will be a split flange that is bolted together with an internal gasket. A telescoping forklift will be used to place all equipment on the berms and electric impacts will be used to assemble the flanges. Company Wrench will have a full service truck onsite with welding, crane and air compressor if needed. Although each unit will be thoroughly inspected and tested prior to shipping, an assortment of extra parts and equipment will also be shipped with the units to eliminate the need to source parts locally to prevent any delays.

System A will be located on the North berm and will use a flooded gravity system from the onsite 475,000 gallon tank. A 10-inch flange will be adapted to the south east side of the tank and a 6-inch diesel pump will be used to pump water to the North berm where pipe will climb the berm and “T” to the east and west or parallel to the stack lay down area. Piping on top of the berm will be placed with a telescoping forklift along with any dust suppression units. Where a dust suppression unit is placed a “T” will be used to reduce the 6 inch by 40 ft aluminum pipe down to a 4 inch VIC fitting that Company Wrench will adapt down to a 1 ½ inch cam lock directly into the dust suppression units. Hoses will be made onsite to be so that the shortest hose length as possible between points will be used. This will reduce potential friction and pressure loss from using longer hoses. The dust suppression units are only relying on the piping system to deliver the volume or total gpm needed to each machine. Each dust suppression unit has a booster pump that will pressurize the water needed for the desired gpm and psi for water atomization. System A will provide water to 4 DD units at 140 gpm and 2 DF units at 85 gpm. The DF units have been placed closest to the base of the stack since the distances between berm and the larger 140 gpm units will be closest to the high impact and largest dust generating area as noted on the dust suppression lay out. A single (1) DF unit will be placed directly behind the north stack and will be have its own generator and a hose will be run from the city water connection located adjacent to the stack.

System B will be much like System A; however it will use two 20,000 gallon frac tanks that will use a manifold system to connect the tanks to a 6-inch diesel powered pump. These tanks will be placed near the south stack along the north layout berm. Piping and dust suppression units will be placed on top of the berm much like System A. The piping will make a 90 degree turn where the two berms meet, connect east of the powerhouse and continue back towards the north stack where it will end in a DF unit. This system will have (3) DD units and (4) DF units and will also use the “T” system tied directly into the mainline and connecting each unit with a short piece of hose.

System C will also use two 20,000 gallon tanks that will be placed between the perimeter fence just southwest of the south stack and behind the large sea containers. A manifold system will
also be used and a 6-inch aluminum pipe system will be placed on the south berm. All units will be placed and connected using “T”s and short pieces of hose exactly like Systems A and B. System C will have (4) DD units and (2) DF units. The larger DD units will be placed along the highest impact area and the last unit will be placed where the existing road past the office into the lay down area. (1) DF unit will be placed behind the south stack tucked behind sea containers and other protective measures. This will be a standalone unit with a generator and will have a direct water source from the end of the 4-inch city water supply line.

Brandenburg’s (2) DB-60 units will be placed with the aerial manlifts behind the berms to the east of the lay down area and raised to provide additional water curtain effect to catch additional dust rising and rolling out towards the highway. These units will each have their own generators and will be tied into System A piping for water supply. One and ½ inch fire hose will be used to supply water to those units. Brandenburg will provide the generators for the two DB-60s and Company Wrench will perform the electrical and water hook up.

Frac tanks will be filled from the water supply behind the south stack. Placement of the tanks will allow for a hose to be run to the tanks to allow for filling while onsite or during the day or night. Water trucks will provide an alternate method to fill the frac tanks.
NOTE: Exact location of dust suppression units will be determined from the result of system testing in the field.
Appendix 9
Canal Dust Cover Design
Appendix 10
Vibration Monitoring Plan
APPENDIX B

Dykon Blast Plan
1½"-1¾" DIA. HOLES DEPTH = ¾ of 'E'

STACK DATA

A  HOLE SPACING
B  HINGE HOLE SIZE
C  HINGE HOLE SIZE
D  HOLE IN STACK
E  SHELL THICKNESS
F  AIR SPACE
G  BRICK THICKNESS
H  STACK INSIDE DIAMETER
J  STACK OUTSIDE DIAMETER
K  STACK HEIGHT
L  HINGE AREA
M  LEG LENGTH

Dykon Explosive Demolition
Tulsa, Oklahoma  918-583-9566
Weather Monitoring Plan

The final step to prepare the chimneys for demolition includes cutting a section of rebar opposite the direction of fall to release tension in the structures. The Blaster’s structural engineer established maximum wind conditions of 15 mph sustained and 30 mph gusts under which the cutting may take place. The demolition team will monitor the weather forecasts leading up to the day of the event and monitor on site wind conditions in the hours leading up to the event. If sustained winds or wind gusts within the established thresholds are observed, a go/no-go decision will be made before cutting the rebar.

The office building at the site has a meteorological station to monitor temperature, humidity, and wind speed / direction. This station has a battery backup and the capability to communicate wirelessly. Once site power is cut-off, the station receiving unit will be moved to the site guard house for continued weather monitoring.

If the on-site meteorological station cannot be used because of a technical problem, a hand-held anemometer will be present on site as a backup and used to monitor wind speed. The person monitoring the anemometer will communicate to the demolition team via hand-held radio communication if wind speeds are approaching the established thresholds.

As another backup option, KVIA-TV has a weather station located near the site at 4140 Rio Bravo Street, which is approximately at the intersection of Executive Center Boulevard and North Mesa Street. Data from this station can be monitored via the internet at: http://weather.weatherbug.com/TX/El%20Paso-weather.html?zcode=z6286&stat=KVIAT Wind speed can be monitored at the command center via laptop computer and communicated to the demolition team via hand-held radio communication.
APPENDIX C

Vibration Modeling and Monitoring
March 21, 2013

Mr. Anthony Guarnero  
Brandenburg Industrial Service Co.  
2625 S. Loomis Street  
Chicago, Illinois 60608  
Cell (312) 287-8813  
guaant@brandenburg.com

Re: Vibration Monitoring Plan and Impact Calculation Study  
612’ and 828’ ASARCO Concrete Stack Demolition  
El Paso, Texas Blast date: TBD

Dear Mr. Guarnero:

Protec Documentation Services Inc., a DBE/WBE-Certified firm with over 30 years experience studying vibrations and their effects on structures, submits this plan and study relating to structures and liabilities located near the above-referenced project.

1.0 SCOPE OF WORK
Protec has been contracted to develop this Vibration Monitoring Plan and Impact Calculation Study, and will monitor ground vibration levels from various positions at its discretion or as requested by client, and/or required by contract specifications.

2.0 INSTRUMENTATION
Protec will use state-of-the-art Instantel brand portable field seismographs for all vibration monitoring on this project. These three-component seismographs are capable of recording peak particle velocity (ppv) vibration levels on horizontal, longitudinal and transverse channels in units of inches per second (in/s). A fourth channel will measure air overpressure in units of decibels (dB). All instrumentation will have been calibrated within the past year, with calibration certificates provided upon request. A copy of seismograph specifications is included as Attachment 1.

3.0 METHODOLOGY
Protec will install up to eight (8) portable field seismographs at various locations around the work site, including at the closest adjacent liabilities. All seismographs will be installed, initiated and downloaded by qualified Protec personnel possessing experience in the collection of similar vibration data, and in accordance with manufacturer’s instructions. Sensor checks will be conducted at all monitoring locations prior to any demolition to ensure that all recording channels are functioning properly. Any seismograph failing a sensor check for any reason will be replaced with a correctly functioning seismograph prior to demolition.

Page 1 of 3
4.0 GROUND VIBRATION CRITERIA
The United States Bureau of Mines (USBM) Report of Investigations RI-8507 concludes that residential structures are most prone to damage as a result of vibration energy within the frequency range of 4-12 hertz. Within this range, 0.50 inches per second maximum particle velocity is recommended to preclude “threshold” damage to the plaster-on-wood lath interior portions of older structures.

Threshold damage is defined by the USBM as the loosening of paint, small plaster cracks at joints between construction elements or the lengthening of existing plaster cracks. A maximum of 0.75 inches per second is recommended for the protection of modern drywall interior construction. The damage threshold is normally much higher for load bearing or other structural portions of the house.

Above 12 hertz, the allowable vibration increases as the frequency increases, up to 40 hertz. Above 40 hertz, a constant 2.0 inches per second level is recommended to protect interior walls and ceilings of structures, regardless of construction material.

Several additional studies have determined that utility pipelines in good working order and monolithic concrete structures such as bridge piers, footers and headwalls in good condition can withstand blast vibration thresholds far higher than the USBM criteria, i.e. five to ten times higher than foundations of residential structures. The same holds true with levees, canals and other waterways whose banks, headwalls and retaining walls are in satisfactory to good condition.

A graphic representation of the USBM recommended criteria is shown in the velocity versus frequency curve included herein as Attachment 2.

5.0 ADJACENT LIABILITIES
The closest site liabilities and distances have been warranted as follows:

828’ stack
Adjacent Structure | Distance to stack (ft)
--- | ---
Powerhouse | 526
Admin building | 1120
IBWC office | 1000
Canal | 800
IBWC dam | 1400
Cal. Canyon homes | 2300
Kiln at the brick plant across the river (American Eagle Brick Co.) | 2200

612’ stack
Adjacent Structure | Distance to stack (ft)
--- | ---
Powerhouse | 600
Admin building | 720
IBWC office | 2000
Canal | 280 ft under roadway, 352 ft to waterway
IBWC dam | 2300
Cal. Canyon homes | 3400
Kiln at the brick plant across the river (American Eagle Brick Co.) | 3270

6.0 IMPACT CALCULATIONS
Protec’s impact vibration predictions for the felling of these structures is included as Attachment 3. These calculations are based on site conditions as described by Brandenburg Industrial Services and Dykon
Explosive Demolition representatives. Also included in Attachment 3 are predictions for distances of liabilities listed above, and vibration data from a previous project showing vibration levels recorded during similar blasting activities (630’ concrete stack at Martins Creek Power Plant, Bangor, PA).

7.0 CONCLUSION
Based upon all available data as detailed in sections 4.0 and 6.0 of this report, our calculations indicate that ground vibration generated by this event should fall within safe and acceptable limits. Please see limitations in section 8.0.

8.0 STUDY LIMITATIONS
This report has been prepared in accordance with generally accepted vibration study practices for the exclusive use of Brandenburg Industrial Services and their clients for specific application to this project. The conclusions and recommendations contained in this report are based upon information supplied by several reputable independent sources, including Brandenburg Industrial Services and Dykon Explosive Demolition, which is correct and accurate to the best of Protec's knowledge as of this report date. Please note that Protec Documentation Services has no first-hand knowledge of the specific condition of nearby liabilities, and as such does not warrant the integrity of such liabilities in relation to blasting. Nor does Protec warrant the actual performance of blasting or demolition work, over which it has no control.

We trust that this plan adequately covers all requirements for this project. Please advise if further discussion is necessary.

Respectfully submitted,
PROTEC DOCUMENTATION SERVICES, INC.

Brent Blanchard
Operations Manager
609-685-2536 mobile

Attachment 1: Instantel Seismograph Specifications
Attachment 2: USBM Report RI-8507 Z-Graph
Attachment 3: Impact Calculations for felling of ASARCO Concrete Stacks, El Paso, TX
Attachment 1:
Instantel Portable Field Seismograph
Specifications
When we asked what you wanted in a vibration monitor, you said “Everything.” So, we designed the Instantel® Minimate® Plus vibration and overpressure monitor. Ever since, it has become a favourite of contractors, consultants, engineers and blasters, because it offers unrivalled features and versatility in a rugged and easy-to-use package.

**Versatile**
Use the Minimate Plus monitor with an Instantel Standard Triaxial Geophone (ISEE or DIN version) and an overpressure microphone (Linear or A Weight) to provide a rugged, reliable compliance monitoring system. Add the Instantel 8-Channel option and a single monitor may be used with two triaxial geophones and two microphones.

For more demanding monitoring applications, the Instantel Blastware® Advanced Module software provides the capability to monitor a broad selection of vibration and overpressure sensors, as well as sensors for structural and environmental measurements. Monitor vibration, ambient environmental conditions, and the movement of structural cracks, all at the same time, all using the same Minimate Plus monitor.

**Intelligent**
For remote installations, the Instantel Auto Call Home™ feature will automatically transfer event files from field to office as they are recorded using a variety of wired or wireless modems. From there, the Blastware Mail feature of the Blastware software automatically distributes files or summary information to multiple e-mail or text messaging addresses.

**Easy to use**
Even with all of these features, the Minimate Plus system is still easy for anyone to use. A high-contrast LCD, eight-key tactile keypad, coupled with simple menu-driven operations, provides complete control and confidence.

Minimate Plus - everything you need and more.

---

**Key Features**
- **Instantel Histogram Combo™** mode allows capture of full waveform records while recording in histogram mode.
- **Auto Call Home** feature automates remote monitoring applications.
- Sample rates from 1,024 to 16,000 S/s, per channel with up to 65,000 S/s available on a single channel.
- Available Instantel 8-channel option allows for two standard geophones and two microphones to be operated from one Minimate Plus monitor.
- Non-volatile memory with standard 300-event storage capacity (optional 1,500-event capacity).
- Records waveform events up to 100 seconds long with standard setup, or up to 500 seconds with advanced setup.
- Continuous monitoring means zero dead time, even while the unit is processing.
- Any channel can be matched to a wide variety of sensors - geophones, accelerometers, or hydrophones.
### Channels
- Microphone and Triaxial Geophone or 4 independent user-configurable channels (two Microphones and two Triaxial Geophones or 8 independent channels with optional 8-channel upgrade)

### Vibration Monitoring (with Standard Triaxial Geophone)
- **Range**
  - Up to 254 mm/s (10 in/s)
- **Resolution**
  - 0.127 mm/s (0.005 in/s)
  - 0.0159 mm/s (0.000625 in/s) with built-in preamp
- **Accuracy (ISEE / DIN)**
  - +/- 5% or 0.5 mm/s (0.02 in/s), whichever is larger, between 4 and 125 Hz / DIN 45669-1 standard
- **Transducer Density**
  - 2.13 g/cc (133 lbs/ft³)
- **Frequency Range (ISEE / DIN)**
  - 2 to 250 Hz, within zero to -3 dB of an ideal flat response / 1 to 315 Hz
- **Maximum Cable Length (ISEE / DIN)**
  - 75 m (250 ft) / 1,000 m (3,280 ft)

### Air Overpressure Monitoring
- **Weighting Scales**
  - Linear or A-weight
- **Linear Range**
  - 88 to 148 dB (500 Pa (0.072 PSI) Peak)
- **Linear Resolution**
  - 0.25 Pa (0.0000363 PSI)
- **Linear Accuracy**
  - +/- 10% or +/- 1 dB, whichever is larger, between 4 and 125 Hz
- **Linear Frequency Response**
  - 2 to 250 Hz between -3 dB roll off points
- **A-weight Range**
  - 50 to 110 dBa
- **A-weight Resolution**
  - 0.1 dBA

### Waveform Recording
- **Record Modes**
  - Manual, Single-shot, Continuous
- **Seismic Trigger**
  - 0.125 to 254 mm/s (0.005 to 10 in/s)
- **Acoustic Triggers**
  - Linear
    - 100 to 148 dB
  - A-weight
    - 55 to 110 dBa
- **Sample Rate**
  - 1,024 to 16,000 S/s per channel (independent of record time), up to 65,000 S/s in single-channel mode with advanced software (max 8,000 S/s per channel for 8 channels)

### Record Stop Mode
- **Record Time**
  - Fixed record time, **Instantel® AutoRecord™** record stop mode
  - 1 to 100 seconds (programmable in one-second steps) or 500 seconds plus 0.25 seconds pre-trigger
  - Auto window programmable from 1 to 9 seconds, plus a 0.25 second pre-trigger. Event is recorded until activity remains below trigger level for duration of auto window, or until available memory is filled.
  - Recording uninterrupted by event processing - no dead time

### Histogram Recording
- **Record Modes**
  - Histogram and **Instantel Histogram Combo™** (monitor captures triggered waveforms while recording in Histogram mode)
- **Recording Interval**
  - 2, 5 or 15 seconds; 1, 5 or 15 minutes
  - 46,656 intervals - 3 days at 5-second intervals or 102 days at 15-minute intervals
  - (with memory upgrade - 15 days at 5-second intervals or 540 days at 15-minute intervals)

### Physical Specifications
- **Dimensions**
  - 81 x 91 x 160 mm (3.2 x 3.6 x 6.3 in)
- **Weight**
  - 1.4 kg (3 lbs)
- **Battery**
  - Rechargeable 6 V sealed gel cell - capacity for 210 hours of continuous monitoring
- **User Interface**
  - 8-key keypad with domed tactile keys
- **Display**
  - 4-line x 20-character, high-contrast, backlit LCD with on-line help
- **PC Interface**
  - RS-232
- **Auxiliary Inputs and Outputs**
  - External Trigger, Remote Alarm, coordinate download from GPS
- **Environmental**
  - LCD Operating Temperature
    - -10 to 50°C (14 to 122°F)
  - Electronics Operating Temperature
    - -20 to 60°C (-4 to 140°F)
  - Remote Communications
    - Compatible with Telephone, GSM, Cellular, RF, Satellite, Short-haul modems and Ethernet® device servers.
  - Automatically transfers events when they occur through the **Instantel Auto Call Home™** feature.
  - Monitor start/stop timer

---

**Corporate Office:**
309 Legget Drive, Ottawa, Ontario K2K 3A3, Canada

**US Office:**
808 Commerce Park Drive, Ogdensburg, New York 13669, USA

**Toll Free:** (800) 267 9111
**Telephone:** (613) 592 4642
**Fax:** (613) 592 4296
**Email:** sales@instantel.com

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CERTIFIED TO THE ISO 9001 QUALITY STANDARD
Attachment 2:
USBM Report of Investigations
RI-8507 Z-Graph
USBM Vibration Criteria

**Graphical Representation:**

- **Frequency (Hz)**轴范围从1.00到100.00。
- **Velocity (in/sec)**轴范围从0.10到10.00。
- 速度为0.75 in/sec 的干墙可以被认为是“危险”的。
- 速度为0.50 in/sec 的石膏可以被认为是“安全”的。
- 速度为2 in/sec 的点图示化。

**Graph Notes:**

- “can be considered "unsafe"”表示可被认为是“危险”的。
- “can be considered "safe"”表示可被认为是“安全”的。
Attachment 3:
Blast Impact Calculations, Calc’s at Adjacent Liabilities,
Previous Vibration Report for Bangor, PA stack blast
### Structural Impact Vibration Predictions
Dykon stacks to be felled 828' stack

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Distance, ft</th>
<th>PPV, in/sec</th>
<th>Distance, Meters</th>
<th>PPV, cm/sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial distance, ft</td>
<td>100</td>
<td>100</td>
<td>30</td>
<td>12.48</td>
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<tr>
<td>Incremental distance, ft</td>
<td>100</td>
<td>200</td>
<td>61</td>
<td>4.73</td>
</tr>
<tr>
<td>Height of Structure, ft.</td>
<td>828</td>
<td>300</td>
<td>91</td>
<td>2.68</td>
</tr>
<tr>
<td>Weight of Structure, tons/seg</td>
<td>17500</td>
<td>400</td>
<td>122</td>
<td>1.79</td>
</tr>
<tr>
<td>Rigidity factor</td>
<td>0.5</td>
<td>500</td>
<td>152</td>
<td>1.31</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.08</td>
<td>600</td>
<td>183</td>
<td>1.02</td>
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<tr>
<td>Soil Freq.</td>
<td>4</td>
<td>700</td>
<td>213</td>
<td>0.82</td>
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<tr>
<td>Duration, ms</td>
<td>1</td>
<td>800</td>
<td>244</td>
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<tr>
<td>Segments</td>
<td>-1.4</td>
<td>900</td>
<td>274</td>
<td>0.58</td>
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<tr>
<td>Slope</td>
<td>1</td>
<td>1000</td>
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<tr>
<td>Intensity</td>
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<td>1100</td>
<td>335</td>
<td>0.43</td>
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<tr>
<td>Period/3, ms</td>
<td></td>
<td>1200</td>
<td>366</td>
<td>0.39</td>
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<td></td>
<td></td>
<td>1300</td>
<td>396</td>
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<tr>
<td></td>
<td></td>
<td>1400</td>
<td>427</td>
<td>0.31</td>
</tr>
<tr>
<td>1st floor ht</td>
<td>n/a</td>
<td>1500</td>
<td>457</td>
<td>0.28</td>
</tr>
<tr>
<td>impact time</td>
<td>n/a</td>
<td>1600</td>
<td>488</td>
<td>0.26</td>
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<tr>
<td>delay time</td>
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<td>1700</td>
<td>518</td>
<td>0.24</td>
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<td></td>
<td></td>
<td>1900</td>
<td>579</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2000</td>
<td>610</td>
<td>0.19</td>
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### Structural Impact Vibration Predictions
Dykon stacks to be felled 612' stack

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Distance, ft</th>
<th>PPV, in/sec</th>
<th>Distance, Meters</th>
<th>PPV, cm/sec</th>
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<td>5.05</td>
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<td>Incremental distance, ft</td>
<td>100</td>
<td>200</td>
<td>61</td>
<td>1.91</td>
</tr>
<tr>
<td>Height of Structure, ft.</td>
<td>612</td>
<td>300</td>
<td>91</td>
<td>1.08</td>
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<tr>
<td>Weight of Structure, tons/seg</td>
<td>6500</td>
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<td>Rigidity factor</td>
<td>0.5</td>
<td>500</td>
<td>152</td>
<td>0.53</td>
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<tr>
<td>Intercept</td>
<td>0.08</td>
<td>600</td>
<td>183</td>
<td>0.41</td>
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<tr>
<td>Soil Freq.</td>
<td>4</td>
<td>700</td>
<td>213</td>
<td>0.33</td>
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<tr>
<td>Duration, ms</td>
<td>1</td>
<td>800</td>
<td>244</td>
<td>0.27</td>
</tr>
<tr>
<td>Segments</td>
<td>-1.4</td>
<td>900</td>
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<td>0.23</td>
</tr>
<tr>
<td>Slope</td>
<td>1</td>
<td>1000</td>
<td>305</td>
<td>0.20</td>
</tr>
<tr>
<td>Intensity</td>
<td>83</td>
<td>1100</td>
<td>335</td>
<td>0.18</td>
</tr>
<tr>
<td>Period/3, ms</td>
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<td>1200</td>
<td>366</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1300</td>
<td>396</td>
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<td>1st floor ht</td>
<td>n/a</td>
<td>1400</td>
<td>427</td>
<td>0.13</td>
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<td>delay time</td>
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<td>segments</td>
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<td>1700</td>
<td>518</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1800</td>
<td>549</td>
<td>0.09</td>
</tr>
<tr>
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<td>1900</td>
<td>579</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2000</td>
<td>610</td>
<td>0.08</td>
</tr>
</tbody>
</table>
Vibration Study

1. Purpose:

The purpose of this study was to measure the effect of vibration from the explosive demolition of the Martins Creek Power Plant Stack in Bangor, Pennsylvania on May 16, 2009.

2. Procedure:

Four Instaintel MiniMate Plus portable field seismographs monitored the vibration produced by the explosive demolition. Instaintel MiniMate Plus Serial No. 8559 was monitoring one foot east of the northeast corner of Cabin 7437, 555 feet east of the blast area. Instaintel MiniMate Plus Serial No. 10931 was monitoring 75 north of the northeast corner of the East CTG Building, 426 feet west of the blast area. Instaintel MiniMate Plus Serial No. 10935 was monitoring one foot south of the utility boxes on a gas line, 702 feet north of the blast area. Instaintel MiniMate Plus Serial No. 11267 was monitoring two feet west of the west façade and five feet north of the southwest corner of the office building, 390 feet northeast of the blast area. The geophones were weighted with 20-pound sandbags.

3. Instruments Used:

The Instaintel MiniMate Plus portable field seismographs record measurements on four channels. Three of the four channels measure ground vibration levels (peak particle velocity) in the transverse, longitudinal, and vertical directions, in units of inches-per-second. The fourth channel records atmospheric overpressure (air blast) in units of decibels.

4. Recommended Vibration Limits:

USBM Report of Investigations RI 8507 states that residential structures are most prone to damage as a result of vibration energy within the frequency range of 4-12 hertz. Within this range, a 0.5-inch per second maximum particle velocity is recommended to preclude "threshold" damage to the plaster-on-wood lath interior portions of older structures.

Threshold damage is defined by the USBM as the loosening of paint, small plaster cracks at joints between construction elements or the lengthening of existing plaster cracks. A maximum of 0.75 inch per second is recommended for the protection of modern drywall interior construction. The damage threshold is normally much higher for load bearing or other structural portions of the house. Above 12 hertz, the allowable vibration increases as the frequency increases, up to 40 hertz. Above 40 hertz, a maximum of 2.0 inches per second level is recommended to protect interior walls and ceilings of structures, regardless of construction material. A graphic representation of the USBM recommended criteria is shown in the velocity versus frequency curve in Attachment #1: USBM Z-Graph located at the end of this report.

5. Measurement Results and Interpretation:

Peak vibration levels and frequencies recorded during the timeframe of this report are listed below, and are cross-referenced with specific recording locations. Full waveform printouts and notes taken on site are included in Attachment #2: Vibration Data & Field Notes.

<table>
<thead>
<tr>
<th>Seismo. #</th>
<th>Location</th>
<th>Distance</th>
<th>In/s</th>
<th>Hz</th>
<th>dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>8559</td>
<td>Cabin 7437</td>
<td>555' East</td>
<td>0.065</td>
<td>7.6</td>
<td>138.8</td>
</tr>
<tr>
<td>10931</td>
<td>East CTG Building</td>
<td>426' West</td>
<td>0.275</td>
<td>7.6</td>
<td>&gt;148</td>
</tr>
<tr>
<td>10935</td>
<td>Gas Line</td>
<td>702' North</td>
<td>0.185</td>
<td>8.5</td>
<td>&gt;148</td>
</tr>
<tr>
<td>11267</td>
<td>Office Building</td>
<td>390' Northeast</td>
<td>0.075</td>
<td>10</td>
<td>146.4</td>
</tr>
</tbody>
</table>
**DYKON - BANGOR, PA**

Date/Time: MicL at 07:00:07 May 16, 2009  
Trigger Source: Geo: 0.100 in/s, Mic: 125 dB(L)  
Range: Geo: 10.00 in/s  
Record Time: 26.569 sec at 1024 sps  
Serial Number: BE8559 V 8.12-8.0 MiniMate Plus  
Battery Level: 6.2 Volts  
Unit Calibration: August 21, 2006 by Instantel Inc.  
File Name: J559CPV.V70C  

Microphone: Linear Weighting  
PSPL: 138.8 dB(L) at 17.146 sec  
ZC Freq: 4.7 Hz  
Channel Test: Passed (Freq = 20.1 Hz Amp = 699 mv)

<table>
<thead>
<tr>
<th>PPV</th>
<th>Tran</th>
<th>Vert</th>
<th>Long</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0650</td>
<td>0.0450</td>
<td>0.0650</td>
<td>in/s</td>
</tr>
<tr>
<td>ZC Freq</td>
<td>6.6</td>
<td>23</td>
<td>7.6</td>
</tr>
<tr>
<td>Time (Rel. to Trig)</td>
<td>-16.795</td>
<td>0.083</td>
<td>16.683</td>
</tr>
<tr>
<td>Peak Acceleration</td>
<td>0.0285</td>
<td>0.0398</td>
<td>0.0265</td>
</tr>
<tr>
<td>Peak Displacement</td>
<td>0.00157</td>
<td>0.00064</td>
<td>0.00145</td>
</tr>
<tr>
<td>Sensor Check: Passed Passed Passed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>7.7</td>
<td>7.2</td>
<td>7.6</td>
</tr>
<tr>
<td>Overswing Ratio</td>
<td>3.4</td>
<td>4.0</td>
<td>3.7</td>
</tr>
<tr>
<td>Peak Vector Sum</td>
<td>0.0731</td>
<td>in/s</td>
<td>at 16.747 sec</td>
</tr>
</tbody>
</table>

Monitor Log:  
May 16/09 07:00:07 May 16/09 07:00:34 Event recorded. (Memory Full Exit)

**USBM RI8507 And OSMRE**

Frequency (Hz)  
Tran: + Vert: x Long: ø

Printed: May 18, 2009 (V 1.01 - 10.01)  
Format: Copyrighted 2009-2016 Instantel - A division of Yaski Corporation
Date/Time: May 16, 2009 06:58:58
Trigger Source: Geo: 0.100 in/s, Mic: 125 dB(L)
Range: Geo: 10.00 in/s
Record Time: 25.142 sec at 1024 sps
Notes:

Serial Number: BE10931 V 8.12-8.0 MiniMate Plus
Battery Level: 6.3 Volts
Unit Calibration: April 29, 2009 by Instantel Inc.
File Name: L931CPVW.EAO

Microphone: Linear Weighting
PSPL: ** dB(L) at 16.360 sec
ZC Freq: 6.0 Hz
Channel Test: Passed (Freq = 20.5 Hz Amp = 578 mV)

<table>
<thead>
<tr>
<th>PPV</th>
<th>Tran</th>
<th>Vert</th>
<th>Long</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.185</td>
<td>0.160</td>
<td>0.275</td>
<td>in/s</td>
</tr>
</tbody>
</table>

| ZC Freq | 8.0 | 12 | 7.6 Hz |

| Time (Rel. to Trig) | 16.120 | 16.330 | 16.671 sec |
| Peak Acceleration | 0.0530 | 0.0530 | 0.0530 g |
| Peak Displacement | 0.00328 | 0.00220 | 0.000550 in |
| Sensor Check | Passed | Passed | Passed |
| Frequency | 7.7 | 7.4 | 7.4 Hz |
| Overswing Ratio | 3.7 | 3.8 | 3.8 |

Peak Vector Sum: 0.296 in/s at 16.127 sec
***: Out of Range

Monitor Log:
May 16/09 06:58:58 May 16/09 06:59:23 Event recorded. (Memory Full Exit)
**Instantel**

**DYKON - BANGOR, PA**

**Date/Time** MicL at 06:59:22 May 16, 2009

**Trigger Source** Geo: 0.100 in/s, Mic: 125 dB(L)

**Range** Geo: 10.00 in/s

**Record Time** 26.526 sec at 1024 sps

**Serial Number** BE11267 V 8.12-8.0 MiniMate Plus

**Battery Level** 6.4 Volts

**Unit Calibration** June 16, 2008 by Instantel Inc.

**File Name** M267CPV.5EY0

**Microphone** Linear Weighting

**PSPL** 140.4 dB(L) at 15.767 sec

**ZC Freq** 8.0 Hz

**Channel Test** Passed (Freq = 20.5 Hz Amp = 551 mv)

<table>
<thead>
<tr>
<th>PPV</th>
<th>Tran</th>
<th>Vert</th>
<th>Long</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0550</td>
<td>0.0550</td>
<td>0.0750</td>
<td>in/s</td>
</tr>
</tbody>
</table>

**ZC Freq**

| Time (Rel. to Trig) | 15.951 | 15.628 | 15.729 | sec |

**Peak Acceleration**

| 0.0265 | 0.0398 | 0.0265 | g |

**Peak Displacement**

| 0.00125 | 0.00065 | 0.00142 | in |

**Sensor Check**

- Frequency: Passed 7.5 7.5 7.6 Hz
- Overswing Ratio: 4.9 3.9 3.7

**Peak Vector Sum** 0.0822 in/s at 15.630 sec

**Monitor Log**

May 16 /09 06:59:22 May 16 /09 06:59:49 Event recorded. (Memory Full Exit)

**Graphs and Data Plots**

- Time Scale: 1.00 sec/div
- Amplitude Scale: Geo: 0.100 in/s/div Mic: 0.0200 psi(L)/div

**Sensor Check**
# Summary of Preliminary Vibration Projections
for ASARCO Stack Demolition Project
El Paso, Texas
Report Date: March 21, 2013
(All structures to be monitored with portable field seismographs)

## 828’ stack

<table>
<thead>
<tr>
<th>Structure</th>
<th>Distance to structure (ft)</th>
<th>Max Vibration Prediction (in/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powerhouse</td>
<td>526</td>
<td>0.485</td>
</tr>
<tr>
<td>Admin building</td>
<td>1120</td>
<td>0.168</td>
</tr>
<tr>
<td>IBWC office</td>
<td>1000</td>
<td>0.196</td>
</tr>
<tr>
<td>Canal</td>
<td>800</td>
<td>0.267</td>
</tr>
<tr>
<td>IBWC dam</td>
<td>1400</td>
<td>0.122</td>
</tr>
<tr>
<td>Cal. Canyon homes</td>
<td>2300</td>
<td>0.055</td>
</tr>
<tr>
<td>Kiln at the brick plant across the river (American Eagle Brick Co.)</td>
<td>2200</td>
<td>0.065</td>
</tr>
</tbody>
</table>

## 612’ stack

<table>
<thead>
<tr>
<th>Structure</th>
<th>Distance to structure (ft)</th>
<th>Max Vibration Prediction (in/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powerhouse</td>
<td>600</td>
<td>0.162</td>
</tr>
<tr>
<td>Admin building</td>
<td>720</td>
<td>0.125</td>
</tr>
<tr>
<td>IBWC office</td>
<td>2000</td>
<td>0.030</td>
</tr>
<tr>
<td>Canal</td>
<td>280 ft under roadway, 352 ft to waterway</td>
<td>0.510, 0.356</td>
</tr>
<tr>
<td>IBWC dam</td>
<td>2300</td>
<td>0.027</td>
</tr>
<tr>
<td>Cal. Canyon homes</td>
<td>3400</td>
<td>0.018</td>
</tr>
<tr>
<td>Kiln at the brick plant across the river (American Eagle Brick Co.)</td>
<td>3270</td>
<td>0.019</td>
</tr>
</tbody>
</table>
APPENDIX D

Air Modeling and Monitoring
Air Modeling Summary

Texas Custodial Trust
Former ASARCO Smelter

April 2013

www.erm.com
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EXECUTIVE SUMMARY

To provide representative analytical results for dust that will be generated when the ASARCO Chimneys are demolished, core samples were collected from two concrete chimneys at the Former ASARCO Smelter Facility in El Paso, Texas. The cores were crushed and sent to a laboratory for analysis. The concentrations of metals and crystalline silica found in the core samples were used in an US EPA air dispersion model to conduct a preliminary assessment of the potential for the modeled constituents to exceed National Ambient Air Quality Standards (NAAQS) or Texas Commission on Environmental Quality (TCEQ) Effects Screening Levels (ESL). The model results for criteria pollutants and non-criteria pollutants are all less than NAAQS and ESLs respectively. Several dust control methods will be used on the day of the explosive demolition event; however, this model conservatively does not take those dust control activities into account. The model results and comparison values are shown in the following tables.

### Model Results for Criteria Pollutants
#### Summary Table

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Averaging Period</th>
<th>Stack Implosion (µg/m³)</th>
<th>Background Concentration (µg/m³)</th>
<th>Total (µg/m³)</th>
<th>NAAQS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PM₁₀</td>
<td>24 Hour</td>
<td>2.3</td>
<td>60</td>
<td>62</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>PM₂₅</td>
<td>24 Hour</td>
<td>0.4</td>
<td>22.2</td>
<td>22.6</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>0.00005</td>
<td>10.9</td>
<td>10.9</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Pb</td>
<td>Rolling 3-month</td>
<td>0.000001</td>
<td>0.05</td>
<td>0.05</td>
<td>0.15</td>
<td>0.15</td>
</tr>
</tbody>
</table>

### Model Results for Non-Criteria Pollutants
#### Summary Table

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Short-term ESL (µg/m³)</th>
<th>Modeled Short-term Concentration (µg/m³)</th>
<th>Long-term ESL (µg/m³)</th>
<th>Modeled Long-term Concentration (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony</td>
<td>5 (PM₁₀)</td>
<td>0.0002</td>
<td>0.5 (PM₁₀)</td>
<td>0.000000002</td>
</tr>
<tr>
<td>Arsenic</td>
<td>3 (PM₁₀)</td>
<td>0.004</td>
<td>0.067 (PM₁₀)</td>
<td>0.00000005</td>
</tr>
<tr>
<td>Barium</td>
<td>5 (PM₁₀)</td>
<td>0.01</td>
<td>0.5 (PM₁₀)</td>
<td>0.000001</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.1 (PM₁₀)</td>
<td>0.0001</td>
<td>0.01 (PM₁₀)</td>
<td>0.00000001</td>
</tr>
<tr>
<td>Chromium</td>
<td>3.6 (PM₁₀)</td>
<td>0.001</td>
<td>0.041 (PM₁₀)</td>
<td>0.0000001</td>
</tr>
<tr>
<td>Cobalt</td>
<td>0.2 (PM₁₀)</td>
<td>0.0003</td>
<td>0.02 (PM₁₀)</td>
<td>0.00000003</td>
</tr>
<tr>
<td>Copper</td>
<td>10 (PM₁₀)</td>
<td>0.004</td>
<td>1 (PM₁₀)</td>
<td>0.0000004</td>
</tr>
<tr>
<td>Iron</td>
<td>50 (PM₁₀)</td>
<td>0.3</td>
<td>5 (PM₁₀)</td>
<td>0.00004</td>
</tr>
<tr>
<td>Mercury</td>
<td>0.25 (PM₁₀)</td>
<td>0.000002</td>
<td>0.025 (PM₁₀)</td>
<td>0.000000002</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>30 (PM₁₀)</td>
<td>0.0007</td>
<td>3 (PM₁₀)</td>
<td>0.0000001</td>
</tr>
<tr>
<td>Nickel</td>
<td>0.33 (PM₁₀)</td>
<td>0.0002</td>
<td>0.059 (PM₁₀)</td>
<td>0.000000002</td>
</tr>
<tr>
<td>Selenium</td>
<td>2 (PM₁₀)</td>
<td>0.0001</td>
<td>0.2 (PM₁₀)</td>
<td>0.000000001</td>
</tr>
<tr>
<td>Zinc</td>
<td>20 (PM₁₀)</td>
<td>0.01</td>
<td>2 (PM₁₀)</td>
<td>0.000001</td>
</tr>
<tr>
<td>Cristobalite</td>
<td>14 (PM₁₀)</td>
<td>0.3</td>
<td>0.27 (PM₁₀)</td>
<td>0.00004</td>
</tr>
<tr>
<td>Quartz</td>
<td>14 (PM₁₀)</td>
<td>10.6</td>
<td>0.27 (PM₁₀)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

G:\2013\011814\19007Hrpt.docx
Based on these results, more detailed modeling is not suggested. In addition, actual dust concentrations from the chimneys are anticipated to be lower than the model results since active dust suppression will be used during demolition.
1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

The Texas Custodial Trust (Trust) plans to demolish two concrete chimneys at the former ASARCO Smelter facility in El Paso, Texas (Site). The two chimneys will be demolished at the same time using explosives to fell the structures. The objective of this task is to use an EPA approved air dispersion model to predict pollutant concentrations from the chimney demolitions and compare the predicted results to the National Ambient Air Quality Standards (NAAQS) and Texas Commission on Environmental Quality (TCEQ) Effects Screening Levels (ESLs). This modeling exercise will also inform the Trust if more refined air quality modeling is suggested.

1.2 OVERVIEW OF METHODOLOGY

On behalf of the Trust, Environmental Resources Management (ERM) performed air quality modeling to estimate emissions associated with the demolition of the chimneys and compare the estimated results to the NAAQS and ESLs.

Applicable site-specific compounds were evaluated. Air quality dispersion modeling was performed for these constituents to assess the potential for off-property ambient air impacts resulting from project-related emissions. The approximate ambient air concentration of each modeled compound was compared against the constituent’s defined NAAQS or ESLs, as applicable.

ERM performed the air quality modeling in accordance with TCEQ guidelines, including the most recent version of the Air Quality Modeling Guidelines (RG-25, revised, TCEQ 1999), policy and guidance memos published on TCEQ’s web site (TCEQ 2012b), and prior guidance provided by the TCEQ Air Dispersion Modeling Team. The key elements of the modeling analysis include:

- Use of the latest version of Toxics Screening Model (TSCREEN, version 4.00.03); and
- Comparison of the appropriate predicted impacts to relevant NAAQS or ESLs to determine if additional modeling is needed.
2.0 PROJECT EMISSIONS AND SOURCE CHARACTERIZATION

Appendix A of this report contains a facility map showing the location of the chimneys that are to be demolished, a scale, and a true-north arrow.

2.1 PROJECT DESCRIPTION

One of the chimneys to be demolished is 828 feet tall; the other is 612 feet tall. The taller stack has a top diameter of 31.25 feet and a bottom diameter of 62.50 feet. The shorter stack has a top diameter of 31.25 feet and a bottom diameter of 46.25 feet. The two stacks will be demolished at the same time.

2.2 ESTIMATED PROJECT EMISSIONS

Emissions calculations are documented in Appendix B. The following sections provide a summary of the estimated project emissions.

2.2.1 Emission factors

Mechanical processes like demolition are not efficient at producing small particles such as PM$_{10}$ and PM$_{2.5}$. These small particles are mainly produced during combustion processes. Other pollutants such as sulfur dioxide (SO$_2$), nitrogen oxides (NO$_x$), and carbon monoxide (CO) are not estimated in this modeling exercise due to the anticipated low quantity of the emissions in comparison of their respective NAAQS standards.

In a report on complex demolition projects, Pacific Northwest National Laboratory estimated that the ratio of the dust to the total demolition impact mass is approximately 0.014 for explosive demolition of large structures. Another report by IHI Environmental estimated that the PM$_{10}$ emission factor for a building is 0.0013 g/ft$^3$ of building imploded. These two estimates correlate well with each other. As a conservative approach, a 5x factor was applied to this data to produce the emission factors used in this model. Therefore, a PM$_{10}$ emission factor of 0.0065, approximately 5 times as much as published estimated values, is used in the emission calculations for this project. IHI Environmental also estimated that the PM$_{2.5}$ fraction out of PM$_{10}$ is 0.18 and that the total suspended particulate (TSP) over PM$_{10}$ ratio is 1.4. Therefore, a PM$_{2.5}$ emission factor of 0.0012 and a TSP (or Nuisance Dust) emission factor of 0.0091 are used in the emission calculations for this project.

2.2.2 Initial dust cloud

The initial dust cloud results mainly from the jets of air forced from the stacks as they collapse. The size of this initial dust cloud is important, since this is the area where the larger size particles will settle out.

It is assumed that the length of the initial dust cloud is 25% longer than the stack heights. The width of the initial dust cloud is estimated at twice as much as the
stack bottom diameter in this modeling exercise. These estimates are based on visual observations of other chimney explosive demolition events.

A water spray system has been designed to suppress dust generated within this initial dust cloud. The effects from the water spray system to suppress dust have not been included in the dust model.

### 2.2.3 Dissipating time

IHI Environmental estimated that the plume associated with a different explosive demolition event was likely to dissipate within 10 to 20 minutes and that the pollutants concentrations were likely to return to nearly normal within 5 minutes of the explosive demolition event. Video documentation from several other explosive demolition events indicate a similar dissipation time. For the purposes of this model, it is conservatively assumed that the dissipating time is 1 hour.

### 2.2.4 Metal and ESL fraction in PM$_{10}$

Core samples were collected from each chimney at heights of 10, 50 and 100 feet above ground surface. The samples were crushed on site and analyzed at laboratories for metals and silica concentrations. Table 2-1 presents the average analytical results for each chimney. The metal and silica concentrations were used as equivalent concentrations in the total PM$_{10}$ estimated to be generated during the event and compared to the associated ESL (which are based on PM$_{10}$ concentrations) as part of this modeling exercise.
### TABLE 2-1: Metal and ESL Average Analytical Results

<table>
<thead>
<tr>
<th>Parameter</th>
<th>CAS No.*</th>
<th>Stack 828 Average** Analytical Results (mg/kg)</th>
<th>Stack 612 Average*** Analytical Results (mg/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony</td>
<td>7440-36-0</td>
<td>3.4</td>
<td>3.2</td>
</tr>
<tr>
<td>Arsenic</td>
<td>7440-38-2</td>
<td>111.5</td>
<td>11.8</td>
</tr>
<tr>
<td>Barium</td>
<td>7440-39-3</td>
<td>139.2</td>
<td>69.3</td>
</tr>
<tr>
<td>Cadmium</td>
<td>--</td>
<td>1.8</td>
<td>2.6</td>
</tr>
<tr>
<td>Chromium</td>
<td>7440-47-3</td>
<td>11.4</td>
<td>7.2</td>
</tr>
<tr>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>6.4</td>
<td>2.3</td>
</tr>
<tr>
<td>Copper (Dusts &amp; Mists)</td>
<td>7440-50-8</td>
<td>91.4</td>
<td>26.9</td>
</tr>
<tr>
<td>Iron (as iron oxide)</td>
<td>7439-89-6</td>
<td>6218.3</td>
<td>5296.7</td>
</tr>
<tr>
<td>Lead</td>
<td>7439-92-1</td>
<td>37.0</td>
<td>52.0</td>
</tr>
<tr>
<td>Mercury metal &amp; inorganic forms</td>
<td>--</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>7439-98-7</td>
<td>17.4</td>
<td>4.0</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>4.2</td>
<td>3.7</td>
</tr>
<tr>
<td>Selenium &amp; compounds</td>
<td>7782-49-2</td>
<td>3.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Zinc and compounds</td>
<td>7440-66-6</td>
<td>252.6</td>
<td>135.9</td>
</tr>
<tr>
<td>Silica, crystalline (cristobalite)</td>
<td>14464-46-1</td>
<td>6833.3</td>
<td>5333.3</td>
</tr>
<tr>
<td>Silica, crystalline (quartz)</td>
<td>14808-60-7</td>
<td>170000.00</td>
<td>243333.3</td>
</tr>
</tbody>
</table>

* A CAS No. is not available for cadmium or mercury  
** 6 samples from the 828' chimney (3 from the outer chimney and 3 from the inner chimney)  
*** 3 samples from the 612' chimney

Low concentrations of a few volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs) were also detected or reported at estimated concentrations. Based on these low detections, these constituents are not anticipated to pose a risk during demolition or during material handling. Consequently, VOCs and SVOCs are not addressed in this report.

#### 2.2.5 Air Monitoring

Up to sixteen (16) perimeter dust monitoring locations will be monitored with TSI DustTrak II Aerosol (DustTrak) monitors as shown on the Site Map in Appendix A.

Prior to the chimney demolitions, high volume air samplers will be installed near the property boundary in three select locations. One will be generally upwind of the chimneys, one will be generally downwind of the chimneys, and one will be between the chimney fall zones and the La Calavera Subdivision. During the Chimney Demolitions, the high volume air samplers and the DustTrak monitors will be used to monitor and collect dust samples for a period of at least one hour after explosives are detonated.
3.0 MODELING METHODOLOGY

3.1 MODEL SELECTION AND APPLICATION

The latest version of EPA’s TSCREEN model (version 4.00.03) was used for predicting ambient emissions for each modeled compound. TSCREEN is a model for screening toxic air pollutant concentrations. Several air toxics dispersion screening models used for various scenarios are imbedded in TSCREEN. Using TSCREEN, a particular release scenario is selected via input parameters, and TSCREEN automatically selects and executes the appropriate air quality model to simulate that scenario. The PUFF model (Petersen, 1982), one of the imbedded models in TSCREEN, is used where the release duration is finite but smaller than the travel time (i.e., an instantaneous release.) Therefore, it was used for this demolition modeling exercise. This model is based on the Gaussian instantaneous puff equation and is applicable for neutrally buoyant non-reactive toxic air releases.

Appendix C presents the modeling inputs and outputs.

The Open Burn / Open Detonation Model (OBODM) version 1.3 was used to compare with estimates from the TSCREEN modeling. OBODM predicts the downwind transport and dispersion of air pollutants using cloud rise and dispersion model algorithms from existing dispersion models such as the Rocket Exhaust Effluent Dispersion Model (REEDM), Dugway Proving Ground’s Real-Time Volume Source Dispersion Model (RTVSM), and EPA’s Industrial Source Complex (ISC) model. OBODM is intended for use in evaluating the potential air quality impacts of the open burning and detonation of obsolete munitions and solid propellants. Therefore, OBODM is also appropriate for the momentum issues with air movement as the stack falls and impacts. OBODM was used to compare with estimates from the TSCREEN modeling on PM$_{10}$ only.

Appendix E presents the modeling inputs and outputs.

3.2 AMBIENT AIR QUALITY STANDARDS AND EFFECTS SCREENING LEVELS

Ambient air quality standards that were addressed are different for criteria pollutants (for which NAAQS have been established) and non-criteria pollutants (for which TCEQ ESLs have been established). The Trust team believes that the ESLs as developed by the TCEQ and the NAAQS for metals, silica and particulate matter are appropriate limits to protect public health around the Site during the demolition event.

The ESLs, per the TCEQ, “are not ambient air standards. If predicted or measured airborne levels of a constituent do not exceed the screening level, adverse health or welfare would not be expected to result. If ambient levels of constituents in air exceed the screening level, it does not necessarily indicate a problem, but a more in-depth review is conducted.”
Table 3-1 presents a summary of the air quality standards that were addressed for PM\textsubscript{10}, PM\textsubscript{2.5}, and lead.

**TABLE 3-1: Primary and Secondary Ambient Standards for Criteria Pollutants**

| Pollutant | Averaging Period | NAAQS  
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Primary (µg/m\textsuperscript{3})</td>
<td>Secondary (µg/m\textsuperscript{3})</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM\textsubscript{10}</td>
<td>24 Hour</td>
<td>150</td>
<td>150</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PM\textsubscript{2.5}</td>
<td>24 Hour</td>
<td>35</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Annual</td>
<td>12</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pb</td>
<td>Rolling 3-month</td>
<td>0.15</td>
<td>0.15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The TCEQ has established ESL concentration levels for compounds that will be modeled for this project; they are summarized in Table 3-2.

**TABLE 3-2: Effects Screening Levels (ESLs) for Non-Criteria Pollutants**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>CAS No.</th>
<th>Short Term ESL (µg/m\textsuperscript{3})</th>
<th>Long Term ESL (µg/m\textsuperscript{3})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimony</td>
<td>7440-36-0</td>
<td>5 (PM\textsubscript{10})</td>
<td>0.5 (PM\textsubscript{10})</td>
</tr>
<tr>
<td>Arsenic</td>
<td>7440-38-2</td>
<td>3 (PM\textsubscript{10})</td>
<td>0.067 (PM\textsubscript{10})</td>
</tr>
<tr>
<td>Barium</td>
<td>7440-39-3</td>
<td>5 (PM\textsubscript{10})</td>
<td>0.5 (PM\textsubscript{10})</td>
</tr>
<tr>
<td>Cadmium</td>
<td>-</td>
<td>0.1 (PM\textsubscript{10})</td>
<td>0.01 (PM\textsubscript{10})</td>
</tr>
<tr>
<td>Chromium</td>
<td>7440-47-3</td>
<td>3.6 (PM\textsubscript{10})</td>
<td>0.041 (PM\textsubscript{10})</td>
</tr>
<tr>
<td>Cobalt</td>
<td>7440-48-4</td>
<td>0.2 (PM\textsubscript{10})</td>
<td>0.02 (PM\textsubscript{10})</td>
</tr>
<tr>
<td>Copper (Dusts &amp; Mists)</td>
<td>7440-50-8</td>
<td>10 (PM\textsubscript{10})</td>
<td>1 (PM\textsubscript{10})</td>
</tr>
<tr>
<td>iron (as iron oxide)</td>
<td>7439-89-6</td>
<td>50 (PM\textsubscript{10})</td>
<td>5 (PM\textsubscript{10})</td>
</tr>
<tr>
<td>mercury metal &amp; inorganic forms</td>
<td>-</td>
<td>0.25 (PM\textsubscript{10})</td>
<td>0.025 (PM\textsubscript{10})</td>
</tr>
<tr>
<td>Molybdenum</td>
<td>7439-98-7</td>
<td>30 (PM\textsubscript{10})</td>
<td>3 (PM\textsubscript{10})</td>
</tr>
<tr>
<td>Nickel</td>
<td>7440-02-0</td>
<td>0.33 (PM\textsubscript{10})</td>
<td>0.059 (PM\textsubscript{10})</td>
</tr>
<tr>
<td>selenium &amp; compounds</td>
<td>7782-49-2</td>
<td>2 (PM\textsubscript{10})</td>
<td>0.2 (PM\textsubscript{10})</td>
</tr>
<tr>
<td>zinc and compounds</td>
<td>7440-66-6</td>
<td>20 (PM\textsubscript{10})</td>
<td>2 (PM\textsubscript{10})</td>
</tr>
<tr>
<td>silica, crystalline (cristobalite)</td>
<td>14464-46-1</td>
<td>14 (PM\textsubscript{10})</td>
<td>0.27 (PM\textsubscript{4})</td>
</tr>
<tr>
<td>silica, crystalline (quartz)</td>
<td>14808-60-7</td>
<td>14 (PM\textsubscript{10})</td>
<td>0.27 (PM\textsubscript{4})</td>
</tr>
</tbody>
</table>

### 3.3 BACKGROUND CONCENTRATIONS

The PM\textsubscript{10} background concentration was obtained based upon TCEQ guidelines. Background concentrations for PM\textsubscript{2.5} and lead were obtained from El Paso monitoring data presented on the EPA AirData website. When more than one El Paso monitor was available for a pollutant, the highest concentration among all monitors was selected as the background concentration. Because quarterly data for lead is not available, the 24-hr concentration was conservatively used for the quarterly background concentration.
4.0 **MODEL RESULTS**

Based on the results of the modeling analysis presented in this report, in all modeled cases, the pollutant concentrations are less than applicable thresholds that would trigger additional analysis.

Three criteria pollutants were modeled: PM\(_{10}\), PM\(_{2.5}\) and lead. Fifteen ESL compounds were modeled: Antimony, Arsenic, Barium, Cadmium, Chromium, Cobalt, Copper, Iron, Mercury, Molybdenum, Nickel, Selenium, Zinc, Cristobalite and Quartz. The maximum ground level concentrations were identified for the appropriate averaging periods, and results were compared to the NAAQS and ESLs. Results are presented in tabular formats in Appendix D. These tables present the highest model generated estimated constituent results along with the constituent’s applicable threshold.

The air model suggests that the demolition event will produce a dust cloud of 550,000 cubic meters, with an average PM\(_{10}\) concentration of 4,800 µg/m\(^3\), for a total release of 2.4 kilograms of PM\(_{10}\). The model estimates that the off-property PM\(_{10}\) concentration for the 24-hour averaging period should be 2 µg/m\(^3\) or less. However, the estimated concentrations are anticipated to return to nearly background within 15 minutes of the demolition event.

The modeled results were used in the TCEQ Modeling and Effects Review Applicability (MERA) flowchart. The MERA is a tool used to evaluate health and welfare impacts of air emissions. With the exception of quartz, all of the estimated maximum concentrations in the model are less than 10% of the short- and long-term ESLs and fall out at Step 5 of the MERA flow charts. The estimated maximum concentrations for quartz in the model are less than 10% of the long-term ESL and fall out at Step 5 of the MERA flow charts and less than the short-term ESL and fall out of Step 9C of the MERA flow charts. This indicates that no additional modeling is needed for these compounds.

Results from the OBODM compared to the estimates from the TSCREEN modeling on PM\(_{10}\). Table 4-1 presents both the OBODM and TSCREEN modeling results for comparison. Predicted PM\(_{10}\) concentrations from both models were similar. The TSCREEN model was slightly more conservative than the OBODM model in this application.

**TABLE 4-1: Model Comparison on PM\(_{10}\) Modeling**

<table>
<thead>
<tr>
<th>Model</th>
<th>Wind Speed (m/s)</th>
<th>PM(_{10}) (µg/m(^3))</th>
</tr>
</thead>
<tbody>
<tr>
<td>OBODM</td>
<td>1.0</td>
<td>1.7</td>
</tr>
<tr>
<td>TSCREEN</td>
<td>1.0</td>
<td>2.3</td>
</tr>
</tbody>
</table>
5.0 REFERENCES


IHI Environmental. *Dust Control and Implosion Management Plan-50 S. Main Street Implosion-Block 76, Salt Lake City, Utah Texas*. April, 6, 2007


Stack Demolition Video 1. http://www.youtube.com/watch?v=CCUG_fGtf9w

Stack Demolition Video 2. http://www.youtube.com/watch?v=CCUG_fGtf9w


Facility Map
Appendix A

April 2013
Project No. 0118148

Environmental Resources Management
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000
Emission Calculations

Appendix B

April 2013
Project No. 0118148
### Emission Calculations for 828’ Stack

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stack height</td>
<td>828 ft</td>
</tr>
<tr>
<td>Bottom diameter</td>
<td>62.50 ft</td>
</tr>
<tr>
<td>Top diameter</td>
<td>31.25 ft</td>
</tr>
<tr>
<td>Stack volume</td>
<td>285,876 ft³</td>
</tr>
<tr>
<td>PM₁₀ emissions</td>
<td>1,858 g</td>
</tr>
<tr>
<td>PM₂.₅ emissions</td>
<td>334 g</td>
</tr>
</tbody>
</table>

PM₁₀ Emission factor in a reference building imploded: 0.0013 g/ft³

PM₁₀ Emission factor used in modeling: 0.0065 g/ft³

PM₂.₅ / PM₁₀ Ratio: 0.18

To be conservative in emission estimate, a 5x emission factor is used.

It is a conservative estimate because it is based on the conservative PM₁₀ estimate.
### Emission Calculations for 612’ Stack

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stack height</td>
<td>612 ft</td>
</tr>
<tr>
<td>Bottom diameter</td>
<td>46.25 ft</td>
</tr>
<tr>
<td>Top diameter</td>
<td>31.25 ft</td>
</tr>
<tr>
<td>Stack volume</td>
<td>88,803 ft³</td>
</tr>
<tr>
<td>PM$_{10}$ emissions</td>
<td>577 g</td>
</tr>
<tr>
<td>PM$_{2.5}$ emissions</td>
<td>104 g</td>
</tr>
</tbody>
</table>

- **Emission factor used in modeling**: 0.0065 g/ft³ building imploded [http://www.airquality.utah.gov/Air-Quality-Board/Packets/2007/May/PDF/Variance.pdf](http://www.airquality.utah.gov/Air-Quality-Board/Packets/2007/May/PDF/Variance.pdf)  Page 40
- **PM$_{10}$ / PM$_{2.5}$ Ratio**: 0.18  [http://www.airquality.utah.gov/Air-Quality-Board/Packets/2007/May/PDF/Variance.pdf](http://www.airquality.utah.gov/Air-Quality-Board/Packets/2007/May/PDF/Variance.pdf)

To be conservative in emission estimate, a 5x emission factor is used. It is a conservative estimate because it is based on the conservative PM$_{10}$ estimate.
TSCREEN Model Input and Output

Appendix C

April 2013
Project No. 0118148

Environmental Resources Management
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000
## Model Inputs for 828' Stack

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total PM(_{10}) released</td>
<td>1,858 (g)</td>
<td>Emission calculations</td>
</tr>
<tr>
<td>Total PM(_{2.5}) released</td>
<td>334 (g)</td>
<td>Emission calculations</td>
</tr>
<tr>
<td>Release height above ground</td>
<td>38 (m)</td>
<td>2X bottom diameter</td>
</tr>
<tr>
<td>Initial lateral dispersion sigma (Y)</td>
<td>73 (m)</td>
<td>1.25X Stack height/4.3</td>
</tr>
<tr>
<td>Initial vertical dispersion sigma (Z)</td>
<td>18 (m)</td>
<td>2X bottom diameter/2.15</td>
</tr>
<tr>
<td>Fence line distance</td>
<td>57 (m)</td>
<td>Measured from a Diagram called &quot;Dust monitoring locations - October 11, 2010 to present&quot;</td>
</tr>
<tr>
<td>Averaging time</td>
<td>1 (hr)</td>
<td>The longest averaging time available in the model</td>
</tr>
</tbody>
</table>
**Outputs for 828' Stack**

Stack828 PM10

TOTAL AMOUNT OF MATERIAL RELEASED (G): 1858.
RELEASE HEIGHT ABOVE GROUND (M): 38.00
INITIAL LATERAL DISPERSION SIGMA (Y) (M): 73.00
INITIAL VERTICAL DISPERSION SIGMA (Z) (M): 18.00

************************************************** ****
***         SUMMARY OF PUFF MODEL RESULTS          ***
************************************************** ****

THE MAXIMUM CONCENTRATION AND THE DISTANCE TO MAXIMUM
CONCENTRATION FOR DISTANCES BEYOND FENCeline .057 (KM).
FOR NEAR SURFACE RELEASE MAXIMUM CONCENTRATION WILL OCCUR AT
THE FENCeline.

AVERAGING           MAXIMUM             DISTANCE TO         STABILITY
TIME (MIN)     CONCENTRATION (G/M**3)   MAX. CONC. (KM)     CLASS
INSTANTANEOUS   6.41E-04            .234               U
 1  6.25E-04            .235       U
 5  3.84E-04            .251       U
15 1.36E-04            .257       U
 * 60 3.40E-05            .257       U

************************************************** ****
**   REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS  **
************************************************** ****

***      PUFF DISTANCES       ***
*********************************

THE MAXIMUM CONCENTRATION AS A FUNCTION OF DOWNWIND DISTANCE
AND THE CONDITIONS THAT PRODUCED THE MAXIMUM AT THAT DISTANCE.

MIXING HEIGHT (M) 320.
WIND SPEED (M/SEC) 1.0

AVERAGING DOWNWIND DISTANCE (KM)
TIME (MIN) MAXIMUM CONCENTRATION (G/M**3) AT VARIOUS DOWNWIND DISTANCES.
STABILITY CLASS THAT PRODUCED THE MAX. LISTED BELOW
0.01 0.03 0.05 0.07 0.1 0.5

<table>
<thead>
<tr>
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<td>*60</td>
<td>1.40E-05</td>
<td>1.62E-05</td>
<td>1.89E-05</td>
<td>2.18E-05</td>
<td>2.58E-05</td>
<td>2.84E-05</td>
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<td>2.84E-05</td>
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<td>U</td>
<td>U</td>
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<td>U</td>
</tr>
</tbody>
</table>

AVERAGING DOWNWIND DISTANCE (KM)
TIME (MIN) MAXIMUM CONCENTRATION (G/M**3) AT VARIOUS DOWNWIND DISTANCES.
STABILITY CLASS THAT PRODUCED THE MAX. LISTED BELOW
1.0 3.0 5.0 7.0 10.0 30.0

<table>
<thead>
<tr>
<th>INST.</th>
<th>4.80E-04</th>
<th>2.90E-04</th>
<th>2.67E-04</th>
<th>2.72E-04</th>
<th>2.40E-04</th>
<th>8.59E-05</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>1</td>
<td>4.69E-04</td>
<td>2.83E-04</td>
<td>2.61E-04</td>
<td>2.69E-04</td>
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<td>8.56E-05</td>
</tr>
<tr>
<td>5</td>
<td>3.03E-04</td>
<td>2.03E-04</td>
<td>1.85E-04</td>
<td>1.71E-04</td>
<td>7.89E-05</td>
<td>1.71E-04</td>
</tr>
<tr>
<td>15</td>
<td>1.08E-04</td>
<td>8.56E-05</td>
<td>6.63E-05</td>
<td>6.83E-05</td>
<td>6.90E-05</td>
<td>4.79E-05</td>
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<tr>
<td>*60</td>
<td>2.69E-05</td>
<td>2.14E-05</td>
<td>1.65E-05</td>
<td>1.71E-05</td>
<td>1.72E-05</td>
<td>1.23E-05</td>
</tr>
</tbody>
</table>

STABILITY CLASSES
U = UNSTABLE
N = NEUTRAL
S = STABLE

* INDICATES AVERAGING TIME THAT WAS SELECTED FOR PLOTTING

************************************************** ****
*** END OF PUFF MODEL OUTPUT ***
************************************************** ****
## Model Inputs for 612' Stack

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total PM$_{10}$ released</td>
<td>577 (g)</td>
<td>Emission calculations</td>
</tr>
<tr>
<td>Total PM$_{2.5}$ released</td>
<td>104 (g)</td>
<td>Emission calculations</td>
</tr>
<tr>
<td>Release height above ground</td>
<td>28 (m)</td>
<td>2X bottom diameter</td>
</tr>
<tr>
<td>Initial lateral dispersion sigma (Y)</td>
<td>54 (m)</td>
<td>1.25X Stack height/4.3</td>
</tr>
<tr>
<td>Initial vertical dispersion sigma (Z)</td>
<td>13 (m)</td>
<td>2X bottom diameter/2.15</td>
</tr>
<tr>
<td>Fence line distance</td>
<td>53 (m)</td>
<td>Measured from a Diagram called &quot;Dust monitoring locations - October 11, 2010 to present&quot;</td>
</tr>
<tr>
<td>Averaging time</td>
<td>1 (hr)</td>
<td>The longest averaging time available in the model</td>
</tr>
</tbody>
</table>
Outputs for 612' Stack

Stack612 PM10

TOTAL AMOUNT OF MATERIAL RELEASED (G): 577.0
RELEASE HEIGHT ABOVE GROUND (M): 28.00
INITIAL LATERAL DISPERSION SIGMA (Y) (M): 54.00
INITIAL VERTICAL DISPERSION SIGMA (Z) (M): 13.00

*******************************************************************************
***         SUMMARY OF PUFF MODEL RESULTS          ***
*******************************************************************************

THE MAXIMUM CONCENTRATION AND THE DISTANCE TO MAXIMUM CONCENTRATION FOR DISTANCES BEYOND FENCELINE .053 (KM). FOR NEAR SURFACE RELEASE MAXIMUM CONCENTRATION WILL OCCUR AT THE FENCELINE.

AVERAGING MAXIMUM DISTANCE TO STABILITY
TIME (MIN) CONCENTRATION (G/M**3) MAX. CONC. (KM) CLASS

INSTANTANEOUS 4.995E-04 .159 U
  1  4.766E-04 .161 U
  5  2.326E-04 .172 U
 15  7.813E-05 .173 U
*  60  1.953E-05 .173 U

*******************************************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
*******************************************************************************

*******************************************************************************
***      PUFF DISTANCES       ***
*******************************************************************************

THE MAXIMUM CONCENTRATION AS A FUNCTION OF DOWNWIND DISTANCE AND THE CONDITIONS THAT PRODUCED THE MAXIMUM AT THAT DISTANCE.

MIXING HEIGHT (M) 320.
WIND SPEED (M/SEC) 1.0

AVERAGING DOWNWIND DISTANCE (KM)
TIME (MIN) MAXIMUM CONCENTRATION (G/M**3) AT VARIOUS DOWNWIND DISTANCES.
STABILITY CLASS THAT PRODUCED THE MAX. LISTED BELOW

0.01  0.03  0.05  0.07  0.1  0.5

==========================================================================
       U   U   U   U   U   N
       U   U   U   U   U   N
       U   U   U   U   U   N
 15 3.104E-05 4.007E-05 5.043E-05 5.978E-05 7.002E-05 5.657E-05
       U   U   U   U   U   N
<table>
<thead>
<tr>
<th>INST.</th>
<th>1.0</th>
<th>3.0</th>
<th>5.0</th>
<th>7.0</th>
<th>10.0</th>
<th>30.0</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>3.560E-04</td>
<td>2.158E-04</td>
<td>2.103E-04</td>
<td>1.909E-04</td>
<td>1.555E-04</td>
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<td>5</td>
<td>1.938E-04</td>
<td>1.105E-04</td>
<td>1.182E-04</td>
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<td>3.595E-05</td>
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<tr>
<td>*60</td>
<td>1.647E-05</td>
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<td>1.031E-05</td>
<td>9.979E-06</td>
<td>5.491E-06</td>
</tr>
</tbody>
</table>

STABILITY CLASSES
U = UNSTABLE
N = NEUTRAL
S = STABLE

* INDICATES AVERAGING TIME THAT WAS SELECTED FOR PLOTTING
Model Results
Appendix D

April 2013
Project No. 0118148
### Model Results for 828’ Stack and 626’ Stack

<table>
<thead>
<tr>
<th>PM$_{10}$</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stack828</strong></td>
<td><strong>34</strong> μg/m$^3$</td>
<td><strong>1-hr averaging time</strong></td>
<td>from Outputs</td>
</tr>
<tr>
<td></td>
<td><strong>0.04</strong></td>
<td>Conversion factor from 1-hr to 24-hr</td>
<td>Assume that the plume is dissipated within an hour</td>
</tr>
<tr>
<td></td>
<td><strong>1.4</strong> μg/m$^3$</td>
<td><strong>24-hr averaging time</strong></td>
<td>Calculated GLC</td>
</tr>
<tr>
<td><strong>Stack612</strong></td>
<td><strong>20</strong> μg/m$^3$</td>
<td><strong>1-hr averaging time</strong></td>
<td>from Outputs</td>
</tr>
<tr>
<td></td>
<td><strong>0.04</strong></td>
<td>Conversion factor from 1-hr to 24-hr</td>
<td>Assume that the plume is dissipated within an hour</td>
</tr>
<tr>
<td></td>
<td><strong>0.8</strong> μg/m$^3$</td>
<td><strong>24-hr averaging time</strong></td>
<td>Calculated GLC</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>2.3</strong> μg/m$^3$</td>
<td><strong>24-hr averaging time</strong></td>
<td>Overall GLC (Stack828 and Stack612)</td>
</tr>
<tr>
<td><strong>60</strong> μg/m$^3$</td>
<td>Background concentration</td>
<td>Common background concentration from TCEQ Guidelines</td>
<td></td>
</tr>
<tr>
<td><strong>62</strong> μg/m$^3$</td>
<td>Predicted + background concentration</td>
<td>Calculations</td>
<td></td>
</tr>
<tr>
<td><strong>150</strong> μg/m$^3$</td>
<td><strong>24-hr averaging time</strong></td>
<td>NAAQS Standard</td>
<td></td>
</tr>
</tbody>
</table>

*The summation of the predicted concentration and the background concentration is less than the NAAQS standard.

<table>
<thead>
<tr>
<th>PM$_{2.5}$</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stack828</strong></td>
<td><strong>6</strong> μg/m$^3$</td>
<td><strong>1-hr averaging time</strong></td>
<td>Assuming concentrations are proportional to emissions</td>
</tr>
<tr>
<td></td>
<td><strong>0.04</strong></td>
<td>Conversion factor from 1-hr to 24-hr</td>
<td>Assume that the plume is dissipated within an hour</td>
</tr>
<tr>
<td></td>
<td><strong>0.26</strong> μg/m$^3$</td>
<td><strong>24-hr averaging time</strong></td>
<td>Calculated GLC</td>
</tr>
<tr>
<td><strong>Stack612</strong></td>
<td><strong>4</strong> μg/m$^3$</td>
<td><strong>1-hr averaging time</strong></td>
<td>Assuming concentrations are proportional to emissions</td>
</tr>
<tr>
<td></td>
<td><strong>0.04</strong></td>
<td>Conversion factor from 1-hr to 24-hr</td>
<td>Assume that the plume is dissipated within an hour</td>
</tr>
<tr>
<td></td>
<td><strong>0.15</strong> μg/m$^3$</td>
<td><strong>24-hr averaging time</strong></td>
<td>Calculated GLC</td>
</tr>
<tr>
<td><strong>Overall</strong></td>
<td><strong>0.4</strong> μg/m$^3$</td>
<td><strong>24-hr averaging time</strong></td>
<td>Overall GLC (Stack828 and Stack612)</td>
</tr>
<tr>
<td><strong>22</strong> μg/m$^3$</td>
<td>Background concentration</td>
<td>from Monitor 481410044 at El Paso, <a href="http://www.epa.gov/airdata/ad_rep_mon.html">http://www.epa.gov/airdata/ad_rep_mon.html</a></td>
<td></td>
</tr>
<tr>
<td><strong>23</strong> μg/m$^3$</td>
<td>Predicted + background concentration</td>
<td>Calculations</td>
<td></td>
</tr>
<tr>
<td><strong>35</strong> μg/m$^3$</td>
<td><strong>24-hr averaging time</strong></td>
<td>NAAQS Standard</td>
<td></td>
</tr>
</tbody>
</table>

*The summation of the predicted concentration and the background concentration is less than the NAAQS standard.

### Lead

| **Stack 828 PM$_{10}$** | **1** μg/m$^3$ | **24-hr averaging time** | Stack828 GLC |
| **Stack 828 Lead Fraction in PM$_{10}$** | **0.00004** | **24-hr averaging time** | Analytical Results |
| **Stack 828 Lead** | **0.0001** μg/m$^3$ | **24-hr averaging time** | Calculations |
| **Stack 612 PM$_{10}$** | **1** μg/m$^3$ | **24-hr averaging time** | Stack612 GLC |
| **Stack 612 Lead Fraction in PM$_{10}$** | **0.0001** | **24-hr averaging time** | Analytical Results |
| **Stack 612 Lead** | **0.00004** μg/m$^3$ | **24-hr averaging time** | Calculations |
| **Overall Lead** | **0.0001** μg/m$^3$ | **24-hr averaging time** | Overall GLC (Stack828 and Stack612) |
| **Overall Lead** | **0.000001** μg/m$^3$ | **1-calendar quarter averaging time** | Overall GLC (Stack828 and Stack612) |
| **0.05** μg/m$^3$ | Background concentration | from Monitor 481410033 at El Paso, http://www.epa.gov/airdata/ad_rep_mon.html; quarterly data are not available, so 24-hr data were conservatively used. |
| **0.05** μg/m$^3$ | Predicted + background concentration | Calculations |
| **0.15** μg/m$^3$ | **24-hr averaging time** | NAAQS Standard |

*The summation of the predicted concentration and the background concentration is less than the NAAQS standard.
<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Antimony</th>
<th>Arsenic</th>
<th>Barium</th>
<th>Cadmium</th>
<th>Chromium</th>
<th>Cobalt</th>
<th>Copper (Dusts &amp; Mists)</th>
<th>Iron (as iron oxide)</th>
<th>Mercury</th>
<th>Molybdenum</th>
<th>Nickel</th>
<th>Selenium</th>
<th>Zinc</th>
<th>Cristobalite</th>
<th>Quartz</th>
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</thead>
<tbody>
<tr>
<td>ESL Pollutant Name</td>
<td>Antimony</td>
<td>Arsenic</td>
<td>Barium</td>
<td>Cadmium</td>
<td>Chromium</td>
<td>Cobalt</td>
<td>Copper (Dusts &amp; Mists)</td>
<td>Iron (as iron oxide)</td>
<td>Mercury</td>
<td>Molybdenum</td>
<td>Nickel</td>
<td>Selenium</td>
<td>Zinc</td>
<td>Cristobalite</td>
<td>Quartz</td>
</tr>
<tr>
<td>Stack 828 PM10 Concentration</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
<td>34</td>
</tr>
<tr>
<td>Stack 828 Pollutant fraction in stack</td>
<td>0.000003</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.000002</td>
<td>0.000001</td>
<td>0.0001</td>
<td>0.01</td>
<td>0.000004</td>
<td>0.000002</td>
<td>0.000004</td>
<td>0.000003</td>
<td>0.003</td>
<td>0.01</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td>Stack 828 Pollutant Concentration (µg/m³)</td>
<td>0.0001</td>
<td>0.004</td>
<td>0.005</td>
<td>0.0001</td>
<td>0.0004</td>
<td>0.0002</td>
<td>0.03</td>
<td>0.2</td>
<td>0.00001</td>
<td>0.001</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.01</td>
<td>0.2</td>
<td>5.8</td>
</tr>
<tr>
<td>Stack 828 Long-term Pollutant Concentration (µg/m³)</td>
<td>0.00000001</td>
<td>0.00000004</td>
<td>0.000001</td>
<td>0.00000001</td>
<td>0.00000004</td>
<td>0.00000002</td>
<td>0.0000004</td>
<td>0.000002</td>
<td>0.00000002</td>
<td>0.00000001</td>
<td>0.00000001</td>
<td>0.00003</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stack 612 PM10 Concentration</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
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<tr>
<td>Stack 612 Pollutant fraction in stack</td>
<td>0.000003</td>
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<td>0.0001</td>
<td>0.000003</td>
<td>0.000001</td>
<td>0.000002</td>
<td>0.00003</td>
<td>0.01</td>
<td>0.0000003</td>
<td>0.000004</td>
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<td>0.1</td>
<td>0.24</td>
</tr>
<tr>
<td>Stack 612 Short-term Pollutant Concentration (µg/m³)</td>
<td>0.0001</td>
<td>0.0002</td>
<td>0.001</td>
<td>0.0001</td>
<td>0.00005</td>
<td>0.001</td>
<td>0.1</td>
<td>0.0001</td>
<td>0.00001</td>
<td>0.00001</td>
<td>0.00002</td>
<td>0.003</td>
<td>0.1</td>
<td>4.9</td>
<td></td>
</tr>
<tr>
<td>Stack 612 Long-term Pollutant Concentration (µg/m³)</td>
<td>0.00000001</td>
<td>0.00000003</td>
<td>0.00000002</td>
<td>0.00000001</td>
<td>0.00000002</td>
<td>0.00000001</td>
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<td>0.00001</td>
<td>0.00000001</td>
<td>0.00000001</td>
<td>0.00000002</td>
<td>0.00000003</td>
<td>0.001</td>
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<tr>
<td>Stack 612 Short-term Pollutant Concentration (µg/m³)</td>
<td>0.0002</td>
<td>0.004</td>
<td>0.01</td>
<td>0.0001</td>
<td>0.001</td>
<td>0.003</td>
<td>0.3</td>
<td>0.0002</td>
<td>0.001</td>
<td>0.0002</td>
<td>0.001</td>
<td>0.001</td>
<td>0.3</td>
<td>10.6</td>
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<tr>
<td>Stack 612 Long-term Pollutant Concentration (µg/m³)</td>
<td>0.00000002</td>
<td>0.00000005</td>
<td>0.000001</td>
<td>0.00000001</td>
<td>0.00000001</td>
<td>0.00000003</td>
<td>0.0000004</td>
<td>0.00004</td>
<td>0.00000002</td>
<td>0.00000001</td>
<td>0.00000002</td>
<td>0.00000003</td>
<td>0.00001</td>
<td>0.00004</td>
<td>0.001</td>
</tr>
<tr>
<td>Long-term ESL limit (µg/m³)</td>
<td>0.5 (PM10)</td>
<td>0.067 (PM10)</td>
<td>0.5 (PM10)</td>
<td>0.01 (PM10)</td>
<td>0.041 (PM10)</td>
<td>0.02 (PM10)</td>
<td>1 (PM10)</td>
<td>5 (PM10)</td>
<td>0.25 (PM10)</td>
<td>30 (PM10)</td>
<td>0.33 (PM10)</td>
<td>2 (PM10)</td>
<td>20 (PM10)</td>
<td>14 (PM10)</td>
<td>14 (PM10)</td>
</tr>
<tr>
<td>Short-term ESL limit (µg/m³)</td>
<td>5 (PM10)</td>
<td>3 (PM10)</td>
<td>5 (PM10)</td>
<td>0.1 (PM10)</td>
<td>3.6 (PM10)</td>
<td>0.2 (PM10)</td>
<td>10 (PM10)</td>
<td>50 (PM10)</td>
<td>0.25 (PM10)</td>
<td>30 (PM10)</td>
<td>0.33 (PM10)</td>
<td>2 (PM10)</td>
<td>20 (PM10)</td>
<td>14 (PM10)</td>
<td>14 (PM10)</td>
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<tr>
<td>Step No. failure of MERA flowchart</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>9C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note</td>
<td>&lt;10% ESL</td>
<td>&lt;10% ESL</td>
<td>&lt;10% ESL</td>
<td>&lt;10% ESL</td>
<td>&lt;10% ESL</td>
<td>&lt;10% ESL</td>
<td>&lt;10% ESL</td>
<td>&lt;10% ESL</td>
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<td>&lt;10% ESL</td>
<td>&lt;10% ESL</td>
<td>&lt;100% ESL</td>
<td></td>
</tr>
</tbody>
</table>
OBODM Model Input and Output

Appendix E

April 2013
Project No. 0118148

Environmental Resources Management
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000
Table 3 (cont.)

- Program Input Data -

- Program Models Selected -

- Concentration
  With depletion due to gravitational deposition
- Using final cloud rise ht. for all calc. distances.
- Flat terrain is assumed.
- Grid system origin is not added to source rectangular coordinates
- Instantaneous sources can use both stable and adiabatic plume rise.
- Grid receptor system is ------------------------ Rectangular

- Print Output Options -

- Print and save data using Detailed processing mode
- Print sum of sources only
- Print concentration output units ----------------- Micrograms/Cubic Meter

- Receptor Grid System Geometry -

Grid system orientation angle (Degrees) ------------------------ .0
Receptor X coordinate units ------------------------ Meters
  Y coordinate units ------------------------ Meters
  Z coordinate units ------------------------ Meters
X origin ------------------------ .00
Y origin ------------------------ .00
X Axis of the grid system (Meters)------------------------ -53.00,
Y Axis of the grid system (Meters)------------------------ .00,

- Source Geometry/Emission Strength -

Material or fuel/explosive ----------- Composition B (56/38/6 RDX-TNT-WAX)
Pollutant/species ------------------------ PM10
Total number of sources ------------------------ 2

<table>
<thead>
<tr>
<th>Source Number</th>
<th>Ident</th>
<th>Reference System</th>
<th>Source Type</th>
<th>Emission Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Composion B only source</td>
<td>Rectangular Volume</td>
<td>Instantaneous</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Composion B only source</td>
<td>Rectangular Volume</td>
<td>Instantaneous</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source Number</th>
<th>X Coordinate</th>
<th>Y Coordinate</th>
<th>Z Coordinate</th>
<th>Release Elevation</th>
<th>Emission Height</th>
<th>Emission Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.0 m</td>
<td>.0 m</td>
<td>.0 m</td>
<td>.0 m</td>
<td>2.40000E+02 lb</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>-65.0 m</td>
<td>300.0 m</td>
<td>.0 m</td>
<td>.0 m</td>
<td>2.40000E+02 lb</td>
<td></td>
</tr>
</tbody>
</table>
### - Program Input Data -

### - Source Geometry/Emission Strength -

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 50.00 m</td>
<td>0.00 m</td>
<td>0.640</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td></td>
<td>1</td>
<td>1319.0 ca/g</td>
<td>43544.87 g/s</td>
<td>2.5 seconds 13.88 m</td>
</tr>
<tr>
<td>2 50.00 m</td>
<td>0.00 m</td>
<td>0.640</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td></td>
<td>2</td>
<td>1319.0 ca/g</td>
<td>43544.87 g/s</td>
<td>2.5 seconds 13.88 m</td>
</tr>
</tbody>
</table>

~ Means the value is defaulted for each hour of met. data.

### - Pollutant/Species Material Characteristics -

- Pollutant/species name: PM10
- Pollutant/species is: Particulate
- Particle material half-life: infinite
- Molecular weight (g/g-mol): 100.0
- Density of species (g/cm**3): 2.3
- Fraction of exhaust cloud constituting pollutant/species: 0.012
- Average particle diameters (um): 10.000
- Ratio of lagrangian to eulerian time-scales: 1.00000
- Fraction of particle material for each category: 1.00000
- Particle settling velocity for each category (m/s): 0.0069
- Particle reflection coefficient for each category: 0.806387

### - Meteorological Data -

( [ #-# ] min-max limits )

- Year: 2013
- Month: 4
- Day: 3
- Hour (DST): 0900
- Minute: 58
- Julian day: 93
- Surface pressure (mb): 870.00
- Cloud cover (8ths): 0.0
- Cloud ceiling (m): 9999.00
- Net radiation index: 1.0
- Pasquill stability category: C

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Table 3 (cont.)

- Program Input Data -
- Meteorological Data -
( [#-#] min-max limits )

Wind speed reference height (m) -------------------------- 10.00
Surface roughness length (cm) [ .00-100.00]----------------------- .000
Vertical grad. of pot. temp. ( C/m) [-5.000- 5.000]------ 0
Reference wind speed ( m/s) [ 1.0- 50.0]------------------------ 1.000
Minimum (at 2m) wind speed (m/s) ------------------------ 1.000
Air temperature ( C) [-60.0- 60.0]----------------------- 20.000
Standard dev. of wind direction angle ( d) [ 1.0000-80.0000]----- 11.0000
Standard dev. wind elevation angle ( d) [ 1.0000-50.0000]------ 4.0000
Longitudinal turbulence intensity ( d) [ 1.0000-106.4000]--------- 14.6300
Measurement time for std. dev. wind dir. angle ( s) [ 2.5-3600.0] 600.00
Air humidity (%) ( .0-100.0)------------------------------- 50.0
Surface mixing layer height ( m) [ 1.0-20000.0]---------------- 600.00
Wind direction (From) (deg) [ 0- 360.0]---------------------- 90.0
Wind-direction shear ( d/m) [-45.0- 45.0]--------------------- .00
Wind-speed power law exponent [ .000-5.000]------------------ .2
Wind-speed shear ( m/s) [ .00- 20.00]---------------------- Compute

- Input/Output Files Used -

Input save data file name ------------------------------- jz2.INP
Output save data file name ------------------------------- jz1.INP
Print solution output file name --------------------------- jz1.OUT
Graphics/solution input/output file ----------------------- jz1.SOL

Table 4
PM10 Peak Concentration (Micrograms/Cubic Meter)

(Due to all sources)

- X Axis (Meters) -

<table>
<thead>
<tr>
<th>Y Axis (Meters)</th>
<th>Concentration</th>
</tr>
</thead>
<tbody>
<tr>
<td>.000</td>
<td>1.70306</td>
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</tbody>
</table>
APPENDIX E

Traffic Control Plans