Record of Decision

Remediation of Soil in the Slit Trench Area of the BMI Common Areas

Henderson, Nevada

September 17, 2007

Section 1.0 - Declaration

1.1 Site Name and Location:

BMI Common Area – Slit Trench Area
Clark County, Nevada

1.2 Statement and Purpose:

This Record of Decision (ROD) presents the selected remedial alternative for the Slit Trench Area (STA) of the BMI Common Areas which is located in Clark County, Nevada. This decision is based upon the Administrative Record. The Nevada Division of Environmental Protection (NDEP), in its discretion under Nevada Administrative Code (NAC) 445A.2271 and 445A.2273, has selected the remedial alternative in accordance with criteria listed in the National Oil and Hazardous Substances Contingency Plan (NCP) at 40 CFR 300.430(f).

1.3 Assessment of the Site:

Actual or threatened release of hazardous substances from this Site, if not addressed by implementing the remedial alternative selected in this ROD, may present an endangerment to public health, welfare or the environment.

1.4 Description of the Selected Remedy:

The Remedy selected in this ROD is the second of a number of RODs planned for the BMI Common Areas Site. This ROD addresses the waste and soil contaminated by hazardous substances within the STA of the BMI Common Areas Site. This ROD selects a final remedy for the STA addressing potential human exposures. This ROD also selects measures to limit the continued migration of hazardous substances from the STA to groundwater. The STA is one of many sources of groundwater contamination at the overall BMI Complex and surrounding areas.

The remedy selected in this ROD addresses the principal threat at the STA by selecting actions that will prevent future releases of hazardous substances from the waste materials in the STA, either upward to the surface, downward into the groundwater, or laterally out from the STA that would create unacceptable risks to human health or the environment. The ROD also selects measures intended to prevent additional contamination of groundwater beneath the STA by selecting response actions to clean up hazardous substance contamination that had been previously released and is currently present in vadose zone soils.

The major components of the selected remedy include:

- Removal of the waste materials present in the Slit Trenches;

- Placement of the waste materials in the newly constructed Corrective Action Management Unit (CAMU) or disposed of off-Site;
- Backfilling of the Slit Trenches with native materials;
- Construction of the CAMU over the former STA;
- Capping of the CAMU and the surrounding areas with an engineered cover;
- Development and implementation of a groundwater monitoring plan;
- Groundwater treatment, as necessary;
- Long-term operation and maintenance of all of the above and related components of the remedy selected in this ROD.

1.5 Administrative Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial alternative, and is cost –effective. This remedy utilizes permanent solutions to the maximum extent practicable. Components of the selected remedy satisfy the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

1.6 Signature

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Leo Drozdoff, P.E., Administrator
Nevada Division of Environmental Protection

Section 2.0 – Decision Summary

2.1 Name, Location, Description

The STA is located within a portion of the BMI Common Areas known as the CAMU Site. The CAMU Site is located in Clark County, Nevada and is more fully described in the Basic Remediation Company (BRC) CAMU Area *Conceptual Site Model* (CSM) dated February 16, 2007. This document is available for review in the NDEP's offices. The CAMU Site is located in portions of the southeast quarter of Section 11 and the southwest quarter of Section 12, Township 22 South, Range 62 East, Mount Diablo Base and Meridian.

The CAMU Site is located within the boundaries of property owned and operated by BRC, in an area formerly designated as the Clark County Industrial Plant Area, and is bordered by former and present industrial facilities of the BMI Industrial Complex. More specifically, the CAMU Site is bounded on the south by the border between property owned by Pioneer Chlor-Alkali Company, Inc. (Pioneer) and property owned by BRC. The eastern CAMU Site boundary is the border between property owned by Tronox (successor to Kerr-McGee Chemical LLC [KMCC]) and property owned by BRC. The northern CAMU Site boundary is defined by the northern limit of the toe of the closed BMI Landfill. The western CAMU Site boundary is defined by a northwest-trending line that runs along the western margin of the proposed aggregate Borrow Pit Area.

The STA is a rectangular-shaped piece of land bounded on the east by the CAMU Site boundary, on the north by the North Landfill Lobe, on the south by the South Landfill Lobe, and on the west by the boundary between the North Landfill Lobe and the North Borrow Pit Lobe. The entire STA is approximately 28 acres in size and includes both areas where waste was disposed and undisturbed areas between and around the actual trenches

A total of 11 aerial photographs taken between 1943 and 2003 were interpreted by BRC to determine the locations and times that the trenches were created and used for waste disposal. In spite of exhaustive searches, no other documentation such as engineering plans and/or construction drawings was discovered; therefore, trench activity was determined based on the presence of linear features within each photograph. The time a trench was in operation is bracketed by the photograph dates from which the feature first appears to when it is no longer visible, although it is important to note that the time interval between photographs is not uniform. The aerial photographs interpreted in this analysis are dated 1943, 1950, 1967, 1969, 1972, 1973, 1974, 1975, 1976, 1987, and 2003. The first photographic record of trench activity is dated 1967, and the last photographic record of trench activity is dated 1976. A 10-year hiatus exists in the photograph record prior to and after the identified trench activity. Therefore, it is not possible to determine from the aerial photographs whether there was trench activity before 1967 and after 1976.

Based on close evaluation of the aerial photographs and field examination, 10 trenches have been identified. The area containing all the identified trenches is 580,000 square feet (ft^2). This area occupies a trapezoidal-shaped area with a southern base length of 1,800 feet, acute base angles 400 feet high (north to south), and a northern length of 1,200 feet (east to west). All trenches were aligned sub-parallel to the trapezoid base and to one another, as well as to the northern levee of the Stauffer/Montrose/Pioneer ponds.

Materials reportedly disposed of in the Slit Trenches are listed in the BRC CAMU Area CSM. Boring logs obtained from field investigations by MWH identify the maximum depth of solid waste disposal within the trenches. These logs (BS-1 through BS-20) report the first occurrence of debris in the STA as shallow as 3 feet bgs and the deepest occurrence of debris at 32 feet bgs. Most of the logged intervals were found to contain backfilled soil, with much lesser amounts of actual trash and debris observed. The most commonly observed depth to trench bottom was nominally 30 feet bgs, with the next most common trench bottom depth being 25 feet bgs.

2.2 Site History and Enforcement Actions

The activities discussed within this ROD are being conducted under the NDEP's authority via Nevada Revised Statutes (NRS) 445A; NRS 445B; NRS 459; CERCLA, 42 U.S.C. Sections 9601 et seq.; and the February 15, 2006 *Settlement Agreement and Administrative Order on Consent*.

As noted above, the history of the STA is not well documented. Years of operation, design of the trenches and materials deposited within the trenches are largely unknown. It is the belief of the NDEP that the waste materials within the STA have been adequately characterized to support remedial and waste management decisions.

The details of the investigation of the STA is contained within *BRC's CAMU Area CSM*.

2.3 Highlights of Community Participation

A Remedial Action Committee (RAC) was formed in 1999 to meet and discuss the overall BMI Common Areas project. The STA is discussed, as necessary, as a function of these meetings. The RAC generally meets on a quarterly basis.

BRC also distributes fact sheets to identified stakeholders and the surrounding community. Most recently, a fact sheet was distributed in 2006 and 2007.

BRC has also constructed a public information kiosk. This kiosk is periodically updated. BRC also operates a web page at http://www.landwellco.com/.

NDEP operates a web page at http://ndep.nv.gov/bmi/basic.htm. In addition, BRC has developed a Community Involvement Plan (CIP) which the NDEP has approved. BRC's CIP is available for review on the NDEP's web page or in the NDEP's offices.

NDEP will provide public notice of the intention to issue the draft ROD and will solicit public comments. If necessary, a public meeting will be held to discuss the draft ROD. Based upon the outcome of this meeting, the draft ROD will be modified before being issued as final.

2.4 Scope and Role of Remedial Alternative

The ROD for the STA is a final remedial decision, addressing the potential for human exposure to hazardous substances on or near the ground surface. This ROD is an interim remedial decision for groundwater by addressing the potential for migration of hazardous substances within the STA from the waste material to soil or groundwater. This ROD is an interim remedial decision for groundwater because the remedy selected in this ROD pertains only to the STA as a groundwater contamination source. There are other areas that are sources of groundwater contamination at the BMI Complex and within the BMI Common Areas. This ROD does not make any remedial decision concerning the groundwater beneath the STA or any other area of the BMI Common Areas or BMI Complex.

This ROD does contemplate the need to potentially address groundwater by BRC for sources that will remain on Site adjacent or within the STA. Measures will be selected by the NDEP to mitigate these remaining sources. Groundwater treatment is expressly contemplated if it is determined to be necessary. Upgradient and cross-gradient sources of contamination are significant and may mask the impacts from the STA and remainder of the BMI Common Areas. The groundwater monitoring required by this ROD is intended to help determine if the STA and remainder of the Common Areas are impacting groundwater.

2.5 Summary of Site Characteristics

As noted above, the STA is described fully in the BRC *CAMU Area CSM* and will not be reiterated herein. Waste materials in the STA contain primarily high levels of volatile organic compounds (VOCs), organochlorine pesticides (OC Pests), metals, and polychlorinated biphenyls (PCBs).

2.6 Summary of Site Risks

A quantitative risk assessment has not been completed for the STA, however, the levels of contaminants within the STA are sufficiently elevated to present risks that are known to be unacceptable.

Data collected within the STA and surrounding areas was compiled in BRC's *CAMU Area CSM* and will not be repeated herein. Data was generally compared to existing environmental quality metrics such as USEPA Maximum Contaminant Levels (MCLs); USEPA region IX Preliminary Remediation Goals (PRGs) and USEPA Soil Screening Levels (SSLs). Based on these comparisons, several of which indicate that concentration of multiple constituents exceed applicable screening criteria by several orders of

magnitude, it is apparent that the materials within the STA represent an unacceptable risk to human health or the environment.

2.7 Remedial Action Objectives

The following four RAOs are proposed for the Site:

1. Prevent future migration of COPCs, including prevention of any further degradation of groundwater quality and prevention of future dust migration.
2. Avoid unacceptable risk to human health under the current or future potential land uses (including construction workers).
3. Avoid other significant collateral environmental impacts such as fugitive dust.
4. Prevent further migration of COPCs already present in groundwater from CAMU area sources

Figure 4-1 of the STA RAS shows the soils and groundwater regions where each of these RAOs are applicable. Cleanup goals or standards that are applicable to these RAOs include:

- for RAO 1, USEPA Region IX Soil Screening Levels as well as dust control requirements promulgated by Clark County;
- for RAO 2, USEPA Region IX Preliminary Remediation Goals;
- for RAO 3, dust control requirements promulgated by Clark County; and
- for RAO 4, the difference between upgradient and downgradient groundwater monitoring.

It is the belief of the NDEP that these RAOs and cleanup goals are protective based on current and future expected land uses. The current and future use of the land is expected to be a landfill proximate to heavy industrial facilities.

2.8 Description of Alternatives

Ten primary alternatives were developed to reduce or eliminate the potential adverse impacts of chemicals in the STA soils on human health and the environment. Alternatives 4 and 5 are further refined by options on the size and location of the proposed remedial action. These alternatives are described in detail in the STA *Remedial Alternative Study* (RAS). These alternatives are as follows:

- Alternative 1 – baseline condition/no action,
- Alternative 2 - institutional controls,
- Alternative 3 – STA cap,
- Alternative 4 - excavation and off-site disposal (various sub-alternatives based on geographic limitations as described in the RAS),

- Alternative 5 - excavation and on-site disposal (various sub-alternatives based on geographic limitations as described in the RAS),
- Alternative 6 - in-situ soil vapor extraction (SVE) treatment,
- Alternative 7 –enhanced in-situ bioremediation (EISB);
- Alternative 8 –in-situ chemical oxidation (ISCO) by ozone;
- Alternative 9 – soil stabilization, and
- Alternative 10 – slurry cut-off wall.

2.9 Summary of Comparative Analysis of Alternatives

This section compares the remedial alternatives described above. The comparative analysis provides the basis for determining which alternative presents the best balance of USEPA's nine evaluation criteria provide in 40 Code of Federal Regulations (CFR) Section 300.430(f) which are presented below.

The first two cleanup evaluation criteria are considered threshold criteria that the selected remedial action must meet. The five primary balancing criteria are balanced to achieve the best overall solution. The two modifying criteria, state and community acceptance, are also considered in the remedy selection.

1. **Overall Protection of Human Health and the Environment** – addresses whether an alternative provides adequate protection from unacceptable risks posed by the Site. (Threshold Criteria)
2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** – addresses whether an alternative attains specific federal and state environmental requirements and state facility siting requirements, or provides grounds for a waiver. (Threshold Criteria)
3. **Long-term Effectiveness and Permanence** – refers to the degree to which an alternative provides reliable protection of human health and the environment over time. (Primary Balancing Criteria)
4. **Reduction of Toxicity, Mobility and Volume through Treatment** – refers to the degree to which an alternative uses treatment to reduce the health hazards of contaminants, the movement of contaminants, or the quantity of contaminants at the site. (Primary Balancing Criteria)
5. **Cost -** evaluates the estimated capital, operation and maintenance, and indirect costs of each alternative in comparison to other equally protective alternatives. (Primary Balancing Criteria)

6. **Short-term Effectiveness** – addresses the degree to which human health and the environment will be adversely impacted during construction and implementation of an alternative. (Primary Balancing Criteria)
7. **Implementability** – refers to the technical and administrative feasibility of an alternative. This includes technical difficulties; uncertainties and the availability of materials and services. It also includes coordination of federal, state and local government efforts. (Primary Balancing Criteria)
8. **State Acceptance** – indicates whether the state agrees with, opposes or has concerns about the preferred alternative. (Modifying Criteria)
9. **Community Acceptance** – includes determining which components of the alternatives people in the community support, have reservations about, or opposes. (Modifying Criteria)

The strengths and weaknesses of the alternatives were weighted to identify the alternative providing the best balance with respect to the nine evaluation criteria.

The comparisons of these criteria are presented in BRC's *Slit Trench Area Remedial Alternative Study* dated July 2007. NDEP concurs with the comparisons presented within this document.

Regarding the installation of the engineered cover over the historic landfills the following is noted:

- These historic landfill units are currently closed;
- Capping of these units, contiguous with the new CAMU, will reduce (or eliminate) infiltration through these units. This reduction in infiltration will minimize the potential for the generation of leachate which may impact groundwater beneath the Site;
- The historic landfills are not considered as part of this ROD and the capping of these units should be considered a mitigative measure employed by BMI; and
- The engineered cover will prevent direct human contact with the contaminants contained within the landfills; prevent generation of uncontrolled runoff and windblown dust; prevent the emissions of contaminants into the air.

2.10 The Selected Remedy

NDEP has determined that the most appropriate remedy for the addressing the STA is Alternative 5d – Excavation with On-Site Disposal – Slit Trench Waste Removal. The remedy will require the following:

- Removal of the materials present in the Slit Trenches;
- Placement of the materials in the newly constructed Corrective Action Management Unit (CAMU) or disposed of off-Site;
- Backfilling of the Slit Trenches with native materials;
- Construction of the CAMU over the former STA;
- Capping of the CAMU and the surrounding areas with an engineered cover;

- Development and implementation of a groundwater monitoring plan;
- Groundwater treatment, as necessary;
- Institutional controls including deed restriction, fencing and signage;
- Long-term operation and maintenance of all of the above and related components of the remedy selected in this ROD.

The selected remedy is an interim remedial decision for groundwater by reducing the potential for migration of hazardous substances within the STA from the waste material to soil or groundwater. This selected remedy is an interim remedial decision for groundwater because the remedy selected in this ROD pertains only to the STA as a groundwater contamination source. There are other areas that are sources of groundwater contamination at the BMI Complex and within the BMI Common Areas. This selected remedy does not make any remedial decision concerning the groundwater beneath the STA or any other area of the BMI Common Areas or BMI Complex.

This selected remedy does contemplate the need to potentially address groundwater by BRC for sources that will remain on Site adjacent or within the STA. If necessary, measures will be selected to mitigate these remaining sources. Groundwater treatment is expressly contemplated if it is determined to be necessary. Upgradient and cross-gradient sources of contamination are significant and may mask the impacts from the STA and remainder of the BMI Common Areas. The groundwater monitoring required by this selected remedy is intended to help determine if the STA and remainder of the Common Areas are impacting groundwater.

Description and Specification of the Remedy

Remedy 5d includes the following:

- The defined limit of the slit trenches would be excavated (see Figure 5-2 of the RAS) to remove the disposed waste as observed during excavation. An in-situ soil volume for this alternative is roughly 4,725,000 ft^3 (or about 175,000 yd^3). This excavated material would be placed in the CAMU. However, approximately 69 cubic yards of soil in the vicinity of boring BS-11 (see Figure 5-3 of the RAS) would not be disposed in the CAMU due to PCB concentrations that exceed 50 ppm. This area, as shown in Figure 5-2 of the RAS is delineated using the completed step-out sampling, and the PCB-containing wastes will be sent offsite to a suitable disposal facility. It is currently believed that this material would be accepted by U.S. Ecology in Beatty, Nevada based upon conversations with the facility. However, the final disposal location for the PCB containing soils could be other facilities, pending waste disposal discussions.
- The excavated cover soil would be replaced into the trench excavations, and backfill would be brought in from the local STA to return the discrete trench excavations to previous grade elevation; the CAMU would then be constructed on top of the back-filled areas.
- Placement of a liner and leachate collection system over the entire CAMU area, including over the STA,
- Placement of waste onto the CAMU liner,

- Placement of a cap or cover over the disposed waste in the CAMU,
- Institutional controls for the entire CAMU, including the STA,
- Upgradient and downgradient groundwater monitoring and potential treatment, as required, based on the results of such monitoring. A separate work plan relating to groundwater monitoring will be submitted to the NDEP and implemented after NDEP approval. The upgradient and downgradient data from this groundwater monitoring will be evaluated for a period of time to be determined by the NDEP and BRC in order to determine the mass loading of any contaminants from the CAMU area sources. The evaluation period will commence after implementation of the selected RAS remedy and the CAMU itself. NDEP will evaluate site groundwater data on a periodic basis and make a separate determination as whether additional groundwater treatment is needed to specifically address groundwater contamination contributed by the STA. BRC will be responsible for implementing such groundwater treatment in conjunction with other parties.; and
- Placement of RCRA Subtitle C equivalent covers over the closed BMI Landfill North and South Lobes.

These actions serve to satisfy RAOs 1 by removing the waste materials from the sub-surface environment and interring these wastes in a permitted disposal facility. The materials left in place will have a limited ability to continue to migrate because the ability of these materials to leach will be severely limited. In addition, the potential for wind blown dust to be generated will be eliminated by covering this area with the CAMU.

These actions serve to satisfy RAO 2 by interring these wastes in a permitted disposal facility and covering the STA with the CAMU. This ostensibly eliminates the risk of risk to human health from the STA. The materials that are not excavated will be inaccessible to humans once the CAMU is constructed.

These actions serve to satisfy RAO 3 by interring these wastes in a permitted disposal facility and covering the STA with the CAMU. In addition, the supplementary mitigative measure of re-capping the historic BMI Landfills serves to satisfy RAO 3.

These actions serve to satisfy RAO 4 by interring these wastes in a permitted disposal facility; conducting groundwater monitoring; and participating in groundwater treatment, as necessary. As noted above, the actions taken during the implementation of this remedy will also severely limit leaching in this area.

2.11 Administrative Determinations

NDEP's primary concern is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, when complete the remedy must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws, unless a statutory waiver is justified. The selected remedy must also be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the NDEP has a preference for remedies that

employ treatment that permanent and significantly reduces the volume, toxicity or mobility of hazardous wastes. The following sections discuss how the selected remedy meets these administrative requirements.

Protection of Human Health and the Environment

The selected remedy protects human health and the environment through a combination of capping and containment of the wastes in the STA. In addition, capping of historic waste disposal units outside of the STA provides additional protection.

Capping and containment of the wastes within the STA effectively eliminates the risk to human health and the environment. The STA wastes will be interred in the CAMU which is lined and capped. In addition, the unit has leachate monitoring and collection, although no leachate is expected to be generated. In addition, groundwater monitoring will be employed. Based upon the results of this monitoring groundwater treatment will be instituted, as necessary.

Compliance with Applicable or Relevant and Appropriate Requirements

The selected remedy will comply with all applicable ARARs. The primary ARARs considered for this decision include:

- National Oil and Hazardous Substances Contingency Plan (NCP);
- USEPA MCLs
- USEPA Region IX Soil Screening Levels;
- USEPA Region IX Preliminary Remediation Goals;
- Nevada Administrative Code (NAC);
- Clark County dust control requirements.

Cost-Effectiveness

A summary of costs is presented in Table 6-1 of the RAS. The cost for the selected remedy has been classified as “low”, however, it is not the lowest cost of all the alternatives. The cost is in the category of “low” at an estimated cost of $2.7MM which is dramatically less than the highest cost of $387.8 MM.

Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

The selected remedy will provide a permanent solution to address the principal threats associated with the STA. Alternative treatment technologies are not utilized, however, it is believed that that the selected remedy provides a balance of tradeoffs in terms of the selection criteria.

Preference for Treatment

The selected remedy does not employ treatment, however, containment is being used to mitigate the principal threats from these materials.

2.11 Documentation of Significant Changes

Significant changes made in response to any comments received will be documented in this section in the Final ROD.