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TECHNICAL MEMORANDUM

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From: Jon Munkers, TerraGraphics, Moscow, Idaho
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Subject: **Technical Memorandum Addressing Regulatory Analysis of Environmental Media Containing DDT and Dieldrin for 317 W. 6th Street, Moscow, Idaho**

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1 Introduction

The U.S. Environmental Protection Agency (USEPA) awarded the City of Moscow the USEPA Brownfields Assessment Coalition Grant (for hazardous substances contamination and petroleum contamination) in August 2010. The City is using the USEPA grant funds to conduct Phase I and II Environmental Site Assessments (ESAs) as well as Analysis of Brownfields Cleanup Alternatives (ABCAs) for multiple Brownfield properties along a former railroad/industrial corridor, future industrial park property, and other negatively impacted and/or stigmatized areas.

The City identified the site as a potential brownfields properties. The Site includes properties at 217 and 317 West 6th Street in Moscow, Latah County, Idaho, which are collectively referred to as 317 West 6th Street (a.k.a., the 6th and Jackson property). The Site is located on the southwest corner of West 6th and Jackson streets, between Moscow's historic downtown district and the University of Idaho Campus. The City contracted TerraGraphics Environmental Engineering, Inc. (TerraGraphics) to conduct additional Phase II ESA work to fill in data gaps and provide an update to Tetra Tech, Inc.'s (Tetra Tech) *Draft Analysis of Brownfields Cleanup Alternatives (ABCA) for 317 West 6th Street, Moscow, Idaho* (2012).

1.1 Site History

The 1928 Sanborn depicts a grain warehouse, old flour mill, feed mill and retail grain sales on-site (Attachment 1). Thirty-two years later, in the 1960 aerial photograph, the old flourmill and

feed mill are still present, with a gap between the buildings for the railroad tracks (Attachment 2). By 1960, wide use of chlorinated pesticides had begun and its use in insect control in flourmills was common (USDA, 1958)

Skipping ahead another 11 years and using the 1971 aerial photograph as a reference, the flour mill is gone, the bulk fertilizer tanks are present where Otto's produce was once located, and the railroad easement is still visible. Historical reports suggest the old flourmill historically connected to the southern Anderson elevators via a tunnel to convey grain from the elevators to the mill. It is reasonable to assume this subsurface tunnel connected to the flourmill's basement. The basement and tunnel system was likely filled in when the flourmill was demolished to bring the grade up to ground level and support the bulk fertilizer tanks (sometime between 1960 and 1971). The brick and other debris in the fill material could reasonably have been the result of the flourmill demolition (Attachment 3).

Photograph 18 (on page 11 of 11 from the extracted Phase I plates) documents the 2008 Site reconnaissance, which shows pesticide storage inside the old grain warehouse in a small room consistent with storing pesticides for use, and clearly not commercial storage (Attachment 4). In addition, the more recent pesticide storage room was inside the warehouse over a substantial concrete floor, so incidental spills resulting from storage would likely not have impacted the Site subsurface soil.

2 Analytical Results and Discussion

Based on Tetra Tech's site-specific risk assessment findings that dichloro-diphenyl-trichloroethane (DDT) and dieldrin were the only Contaminants of Concern (COCs) identified in soil. Tetra Tech's assessment only sampled soils in the top 6-inches. Therefore, the City tasked TerraGraphics to collected additional soil samples at depth. TerraGraphics collected additional soil samples at depth (Table 1). The laboratory analyzed for DDT and dieldrin using USEPA Method 8081A for samples collected from the 6- to 12-inch increment from all sample units (SUs), but extracted all the samples in order to extend the holding times. The purpose was to only analyze those samples necessary for planning of remedial actions, thus minimizing costs associated with laboratory analysis.

Dieldrin was not detected in any of the four samples and thus was not analyzed in deeper samples (Table 1). DDT was detected in all four samples with concentrations from the 6- to 12-inch depth interval in SUs A and B and with concentrations from SUs C and D exceeding the RATL-1 [Remedial Action Target Levels-Scenario 1] from Tetra Tech's report (Table 1). Therefore, TerraGraphics instructed the lab to analyze samples collected deeper than 12 inches from SUs C and D for DDT. DDT was detected at the 48-inch depth interval but did not exceed Tetra Tech's calculated RATL-1 (Tetra Tech, 2012).

Table 1 lists the results from the Tetra Tech fieldwork for DU2 [decision unit 2] and TerraGraphics fieldwork. S2-SS2-02 (collected by Tetra Tech) is the same area as S2-SS2-A and S2-SS2-B (collected by TerraGraphics). S2-SS2-01 (collected by Tetra Tech) is the same area as S2-SS2-C and S2-SS2-D (collected by TerraGraphics).

Table 1. 6th and Jackson Soil Sample Results (mg/kg) for DU2

Sample Number	Sample Depth (inches)	Sample Date	DDT	Dieldrin
S2-SS2-02*	0-6	4/25/2012	0.51	**0.011**
(S2-SS2-A 6-12)110513	6-12	11/5/2013	0.0436	<0.005
(S2-SS2-B 6-12)110513			0.514	<0.005
S2-SS2-01*	0-6	4/25/2012	**1.10**	<0.0057
(S2-SS2-C 6-12)110513	6-12	11/5/2013	**4.23**	<0.005
(S2-SS2-D 6-12)110513			**3.29**	<0.005
(S2-SS2-C 12-18)110513	12-18		**1.14**	NA
(S2-SS2-D 12-18)110513			**2.34**	NA
(S2-SS2-C 18-24)110513	18-24		0.506	NA
(S2-SS2-D 18-24)110513			0.179	NA
(S2-SS2-C 24-30)110513	24-30		0.228	NA
(S2-SS2-D 24-30)110513			0.0694	NA
(S2-SS2-C 30-36)110513	30-36		0.0452	NA
(S2-SS2-D 30-36)110513			0.0290	NA
(S2-SS2-C 36-48)110513	36-48		<0.005	NA
(S2-SS2-D 36-48)110513			0.0116	NA
RATL-1 (Tetra Tech 2012)			**0.713**	**0.0093**
EPA Residential RSL for DDT			**1.70**	
EPA Industrial RSL for DDT			**7.00**	

Notes:
* Samples collected by Tetra Tech.
Bold indicates result exceeds the RATL (Remedial Action Target Level-Scenario 1 or residential use) calculated by Tetra Tech in 2012 for the respective samples collected.
< = result is less than the method detection limit (MDL)
NA = Not Analyzed
NC = Not Calculated
RSL=Regional Screening Level

3 Regulatory Analysis of DDT and Dieldrin

3.1 Background

DDT is an organochlorine insecticide. After World War II in 1945, DDT was made available for use as an agricultural pesticide and its production and use duly increased (WHO, 1979). One of the standard uses was as a flourmill and warehouse fumigant (Journal Agricultural Food Chemistry, 1953). Research conducted by the U.S. Department of Agriculture (USDA) in 1945 provided strong support on the effectiveness of DDT against insect pests of stored seed, grain, and milled cereal products (R.T. Cotton et al., 1945).

There was a large public outcry regarding the human health effects of DDT. In 1972, the public pressure eventually led to a ban on the agricultural use of DDT in the United States (Lear, Linda 1997). It was banned in the U.S. and many other parts of the world in 1972 except for use in controlling emergency public health problems. There are certain parts of the world that still use DDT in controlling vector-borne diseases, such as malaria. The release of DDT into the environment occurs primarily through spraying applications onto agricultural crops, forest lands, other nonagricultural land and homes (ATSDR, 2002b).

Dieldrin was originally produced in 1948 by J. Hyman & Co, Denver, as a pesticide. Originally developed in the 1940s as an alternative to DDT, dieldrin proved to be highly effective and was very widely used during the 1950s to early 1970s (Wikipedia, 2014). Dieldrin are the common names of two structurally similar compounds that were once used from 1950 through 1970 as insecticides on crops such as corn and cotton. In 1972, the EPA approved aldrin and dieldrin for killing termites. In 1987, the manufacturer voluntarily canceled the registration for using in controlling termites. Dieldrin was banned in 1974, except to control termites. In 1987, USEPA banned all uses (ATSDR, 2002a).

DDT and dieldrin are both persistent chemicals. DDT can last in the soil for potentially hundreds of years. Most DDT breaks down into DDE and DDD, generally by the action of microorganisms. These chemicals also have the ability to evaporate into the air and be deposited in other places. DDT sticks strongly to soil. DDT will last for a shorter time in areas that have high evaporation rates and where the soil is wet (ATSDR, 2002b). Dieldrin in soil or water breaks down very slowly. It will stick to soil and may stay unchanged for years. Dieldrin does not dissolve in water easily. Most dieldrin in the environment attaches to soil and to sediment at the bottoms of lakes, ponds, and streams (ATSDR, 2002a).

The following questions will be evaluated to determine the regulatory status of the area.

3.2 Is Contaminated Media a Solid Waste?

The general geology observed in the borings consists of (top to bottom) fill soil comprising silty gravel or gravelly silt and some woody debris, concrete, brick, and/or charcoal. Since the borings are a mixture of media and debris, the waste is therefore categorized as remediation waste. 40 Code of Federal Regulations (CFR) 260.10 defines remediation waste as "*all solid and hazardous wastes, and all media (including ground water, surface water, soils, and sediments) and debris that are managed for implementing cleanup.*" Contaminated media is further defined as a subset of remediation waste. Media include groundwater, surface water, soils, and

sediments, but not debris or solid waste under Resource Conservation and Recovery Act (RCRA) (61 FR 83).

3.3 Is the Remediation Waste a Hazardous Waste?

> *The environmental media portion of remediation waste is usually contaminated through accidental spills of hazardous waste or spills of product chemicals that, when spilled, become hazardous wastes. Contaminated environmental media, of itself, is not hazardous waste and, generally, is not subject to regulation under RCRA. Contaminated environmental media can become subject to regulation under RCRA if they "contain" hazardous waste* (USEPA, 1998).
>
> *The contained-in policy defines when some contaminated media can be considered to no longer "contain" hazardous waste. When [US]EPA or an authorized State determines that media do not "contain" hazardous waste, RCRA does not generally pose a barrier to remediation because permitting requirements, LDRs [Land Disposal Restrictions] (generally), and MTRs [Minimum Technical Requirements] do not apply to media that do not contain hazardous waste. However, the contained-in policy is limited to media only, and does not provide any flexibility for other remediation wastes nor does it provide needed flexibility for highly concentrated media* (63 FR 229).

DDT and dieldrin were not commonly the type of chemicals shipped in bulk by rail to local farming businesses for bulk storage and distribution, which may have resulted in spills and releases of the chemicals during off-loading. Higher contamination levels detected in soil, and greater than those observed at the Site, usually indicate the spread of contaminants through spills and releases to the soil. The detected levels onsite are more consistent with product application of both the DDT and dieldrin pesticides to the soil surface, and on past structures, which were demolished onsite and may reside throughout the Site as limited fill material (Table 1).

Dieldrin and DDT were detected above the RATL-1 (Tetra Tech, 2012) at the surface down to 6 inches below grade. DDT was further detected above the RATL-1 down to 18 inches below grade in the area of the mill demolition (debris in this area includes soil, concrete bricks, etc.). TerraGraphics continued to collect samples and analyze them for DDT to a depth of 48 inches below grade. All values beyond 18 inches are below the RATL-1 developed by Tetra Tech (2012). No high levels, suggesting a spill, of either DDT or diedrin were detected in either the soil or debris (Table 1).

RCRA does exclude chemical products that have been applied to the land for their intended purpose. 40 CFR 261.2(c)(1)(ii) states: "*commercial chemical products listed in §261.33 are not solid wastes if they are applied to the land and that is their ordinary manner of use.*" The only waste category that would include DDT and dieldrin is as a discarded chemical product "listed waste" under 40 CFR 261.33. DDT and diedrin are on the list with waste codes U061 and P037, respectively; however, to be considered as hazardous waste, they must have been "*applied to the land in lieu of their original intended use*", meaning discarded.

A search and review of historical information and records found no evidence of bulk storage or bulk transportation of DDT or dieldrin to the Site and no evidence of spills or releases to the soil from these chemicals. There is also no evidence or information (manifests, storage records, or

vouchers) to document the historical source of the contaminants. Use of DDT and dieldrin for insect control at mill sites is well documented prior to the ban of DDT and dieldrin (an intended use), and prior to the development of RCRA legislation.

RCRA guidance recommends:

> *"... where a facility owner/operator makes a good faith effort to determine if a material is a listed hazardous waste but cannot make such a determination because documentation regarding a source of contamination, contaminant, or waste is unavailable or inconclusive, [US]EPA has stated that one may assume the source contaminant or waste is not listed hazardous waste, RCRA requirements do not apply. This approach was first articulated in the Proposed NCP [National Oil and Hazardous Substances Pollution Contingency Plan] preamble which notes that it is often necessary to know the source of a waste (or contaminants) to determine whether a waste is a listed hazardous waste under RCRA. The proposed NCP preamble goes on to recommend that the lead agency use available site information such as manifests, storage records and vouchers in an effort to ascertain the sources of wastes and contaminants, but when this documentation is not available or inconclusive the lead agency may assume that the wastes (or contaminants) are not listed RCRA hazardous wastes. This approach was confirmed in the final NCP preamble."* (USEPA, 1998)

4 Conclusion

The City has made a good faith effort to determine if the contaminated soils contain listed hazardous waste, and therefore would be subject to the RCRA regulations including Land Disposal Restrictions. To meet the RCRA listed definition, the COCs DDT and dieldrin would have had to have been discarded to the soil as unused chemical products through spills and releases. There is no historical evidence to support the listed definition.

Historical research and soil data results provide information to support the City's conclusion that the soil does not contain RCRA-listed waste and is also therefore not subject to meeting the Land Disposal Restriction standards.

Although RCRA and Land Disposal Restriction standards do not apply to the Site's contaminated soil, the project is providing a net environmental benefit by utilizing aggressive remediation strategies, and using Idaho's Risk Evaluation Manual (IDEQ, 2012) of conservative risk-based target levels evaluated against site-specific data.

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Attachment 1. Sanborn Insurance Maps

Attachment 2. Aerial Photographs

Attachment 3. Brick and concrete in the area of the historic mill.

Figure 1. Concrete and brick encountered onsite to suggest concentrations at depth could be from application around historic foundations of the flourmill site.

Attachment 4. Phase I ESA photographs documenting historic pesticide storage.