Documentation of Environmental Indicator Determination
in Accordance with EPA Interim Final Guidance 2/5/99

RCRA Corrective Action
Environmental Indicator (EI) RCRIS Code (CA750)

Migration of Contaminated Groundwater Under Control

Facility Name: Broski Brothers, Inc.
Facility Address: 39th & Belmont, Kansas City, Missouri
Facility EPA ID #: MOT300010972

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

   __X__ If yes - check here and continue with #2 below.

   _____ If no - re-evaluate existing data, or

   _____ If data are not available, skip to #8 and enter"IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EIs developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EIs are near-term objectives which are currently being used as Program

measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated groundwater and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration/Applicability of EI Determinations

EI Determination status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

2. Is **groundwater** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

   __**X**__ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

   _____ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

   _____ If unknown - skip to #8 and enter "IN" status code.

   Rationale and Reference(s): Key contaminants - cadmium, .069 mg/L; lead, .382 mg/L; iron, 723 mg/L; manganese, 31.1 mg/L; and zinc, 333 mg/L (peak test results from most impacted well, OWAB-210A, for the last three quarters of testing (reference #1- see last page for list of references). Appropriate protective standard levels (ref #2): cadmium, .010 ppm; lead, .050 ppm; iron, 1.62 ppm; and manganese, .761 ppm. The appropriate level for zinc is 5 mg/L (10 CSR 20-7.031(5) and Table A).

Footnotes:

[1] "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

3. Has the **migration** of contaminated groundwater **stabilized** (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[2] as defined by the monitoring locations designated at the time of this determination)?

   __X__ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[2]).

   _____ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[2]) - skip to #8 and enter "NO" status code, after providing an explanation.

   _____ If unknown - skip to #8 and enter "IN" status code.

   Rationale and Reference(s): Broski has conducted several years of monitoring that has shown the plume to be relatively small and stable in terms of size and concentration of contaminants. In 1996 Broski modified their original impoundment closure plan and performed activities that raised the pH of the contaminant plume to further reduce the mobility of the lead, cadmium, iron, manganese and zinc contaminants contained in the plume. Broski continued groundwater monitoring after completion of the closure stabilization modification for 1-year. The results of that monitoring indicate that the plume has remained stable. The analytical results since 1990 also demonstrate a steady historical decline in the concentration of contaminants in the most seriously impacted monitoring well. Documentation of the groundwater monitoring results are contained in the Hazardous Waste Program's groundwater monitoring and TSD files. See Ref #3.

[2] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

__X__ If yes - continue after identifying potentially affected surface water bodies.

_____ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s): Monitoring well OWAB-210A has historically exhibited contamination at or above groundwater protection standards (see response to Rationale and Reference(s) for Question 2). OWAB-210A is hydraulically downgradient from the impoundment between the impoundment and the Blue River. OWAB-210A is the furthest downgradient monitoring well at the facility within the plume of contamination, prior to groundwater entering the Blue River.

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[3] of each contaminant discharging into surface water is less than 10 times the appropriate groundwater "level," and there are no other conditions (e.g., the nature or number of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments or eco-systems at these concentrations)?

_____ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[3] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgement/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments or eco-system.

__X___ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[3] of each contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in

concentrations[3] greater than 100 times the appropriate groundwater "levels," the estimated total amount (mass in kg/yr) of each of these

contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

_____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s): For concentration of each contaminant, see response to Rationale and Reference(s) for Question 2. Although contaminant concentration in the plume does exist at concentrations greater than 10 times the appropriate "level", there are other conditions significantly decreasing the potential for unacceptable impacts to surface water, sediments and eco-systems. The evidence of sampling and analyses demonstrates that, historically, concentrations are decreasing. Iron has been documented to exist in the plume of contamination at levels greater than 100 times the appropriate level. Using the peak test results for the most recent three months of testing, the estimated total amount of iron loaded into the surface water body would be 6,156 kg/yr (calculations attached). Manganese and zinc have been documented to exist in the plume of contamination at levels about 40 to 70 times the appropriate level. Lead and cadmium have been documented at levels less than 10 times the appropriate level.

[3] As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[4])?

___X__ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; or 2) providing or referencing an interim-assessment,[5] appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialist(s), including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which

should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

_____ If no - (the discharge of "contaminated" groundwater cannot be shown to be "**currently acceptable**") - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments and/or eco-systems.

_____ If unknown - skip to 8 and enter "IN" status code.

Rationale and Reference(s): Conditions significantly decreasing the potential for unacceptable impacts are as follows: **(I)** US EPA, in **Drinking Water Regulations and Health Advisories**, October 1996, described iron, manganese and zinc contaminants as secondary contaminants affecting "…taste, odor, color and certain other non-aesthetic effects of drinking water." The document recommends levels for these contaminants, but does not provide enforceable levels. The Missouri Water Quality Standards, under 10 CSR 20-7, although providing enforceable levels for these contaminants, do not differentiate between 'primary' contaminants and 'secondary' contaminants. The differentiation made by the US EPA suggests a difference in degree of hazard posed by the elevated levels of the 'secondary' contaminants, i.e., by the iron, manganese, and zinc, versus similar levels of 'primary' contaminants. **(II)** As noted previously, a relatively small plume of contaminated groundwater from Broski appears, based on hydraulic information, to enter the Blue River immediately adjacent to the location of the former impoundment. A 1990 USGS Water Data Report indicates that the average daily flow for the Blue River is 159 cubic feet per second. Given the relatively small size of the plume and the flow of the Blue River it is reasonable to believe that any impact the plume might have on the Blue River would be negligible. It is estimated that the average contribution of iron, the contaminant most exceeding the protective standard, from the contaminated groundwater to the Blue River would raise the iron concentration in the river by about 0.05 mg/L (calculations attached, including calculations for other key contaminants). The 0.05 mg/L represents the increase in iron concentration of the Blue River assuming: 1) the Blue River at average flow, 2) the entire plume from the impoundment having an iron concentration equal to the highest concentration of the last three sampling periods, and 3) the entire plume discharging to the river. This is supported by sediment sampling results that show no impact by the

closed surface impoundment on the Blue River (letter dated August 21, 1995, from Mr. Dennis Haag/George Butler Associates, Inc. (GBAI) to Mr. Rob Morrison/MDNR, RE: Testing Results for All-Brite Lagoon Post Closure Demonstration Project). **(III)** Further, these levels for the most impacted well have been decreasing during the duration of the groundwater monitoring program (Ref #5). **(IV)** Lastly, the US Army Corp of Engineers is slated to begin in the very near future a channel modification project for the Blue River along the stretch immediately adjacent to the former impoundment. The project will include the excavation and removal of the former impoundment and associated groundwater plume. This rechannelization project is slated to begin in the spring of 2000. Given the low toxicity of these contaminants, the minimal or lack of impact of the contaminated groundwater on the Blue River due to dilution effects, the evidence of historically decreasing concentrations in the groundwater and the anticipated completion of the channel modification project, it is reasonable to conclude that both current and future discharge of contaminated groundwater to the Blue River will have an insignificant impact on surface water quality.

[4] Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

[5] The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

7. Will groundwater **monitoring**/measurement data (and surface water/sediment/ ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the “existing area of contaminated groundwater?”

__X__ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the “existing area of groundwater contamination.”

_____ If no - enter “NO” status code in #8.

_____ If unknown - enter “IN” status code in #8.

Rationale and Reference(s): Verification of the expectation that groundwater contamination will not be migrating horizontally or vertically beyond the existing area of groundwater contamination consists of the completion of the channel modification project on the Blue River by the U.S. Army Corps of Engineers, Kansas City District (USACOE). This project is scheduled to begin in the spring of 2000 and will include complete removal of the former surface impoundment (final drawings and specifications are soon to be provided MDNR by the USACOE). The rationale for a 'Yes' entry is based on a small, stable plume composed of contaminants in steadily diminishing concentrations that is scheduled to be completely excavated in the next 12- 18 months. The contaminants of concern are metals, and remediation of the plume area has immobilized these constituents by raising the pH of the soil. Groundwater monitoring has been occurring at the site from 1982 to 1997, with no significant plume migration observed. Thus, there is a very high confidence that the contamination will not be migrating in the short interval prior to removal, and the verification of non-migration will occur when removal is complete.

8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (Event Code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

__X___ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control" at the Broski Brothers, Inc. facility, EPA ID # MOT300010972, located at 39th & Belmont, Kansas City, Missouri. Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater." This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

_____ NO - Unacceptable migration of contaminated groundwater is observed or expected.

_____ IN - More information is needed to make a determination.

Completed by: (Signature)_____ Date _____
(Print) David L. Walker
(Title) Environmental Engineer

Supervisor: (Signature)_____ Date _____
(Print) Robert K. Morrison
(Title) Chief, Land Disposal/PCB Permit Unit

(EPA Region or State) Missouri

Locations where References may be found:
Missouri Dept. of Natural Resources' Hazardous Waste Program
1738 E. Elm St.
Jefferson City, MO 65109

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References:

1. Letters dated January 7, 1997, April 28, 1997 and July 11, 1997, from Mr. Stan Broski/Broski Brothers, Inc, to Mr. Bruce Stuart/Missouri Department of Natural Resources (MDNR).
RE: Quarterly Groundwater Monitoring Data

2. Letter dated June 6, 1996, from Mr. John Young/MDNR to Mr. Michael Broski/ Broski Brothers, Inc.
RE: Closure Plan Modification Approval

3. Closure Report for the All-Brite Lagoon Post Closure Project, dated November 22, 1996, by GBAI.

4. Letter dated August 21, 1995, from Mr. Dennis Haag/GBAI, to Mr. Rob Morrison/ MDNR.
RE: Testing Results for All-Brite Lagoon Post Closure Demonstration Project

5. “Monitoring Data Summary,” Groundwater Monitoring 1995 Annual Report, dated February 27, 1996, by Taylor Environmental, Inc.