



5 de febrero de 2026

Por e-mail

Laura Friedli, Abogada-Asesora
Agencia de Protección Ambiental de Estados Unidos Región 9
75 Hawthorne Street
San Francisco, CA 94105
Friedli.Laura@epa.gov

Ref.: Respuesta de Chiquita Canyon, LLC al Aviso de Deficiencia y Aclaración

Estimada Sra. Friedli:

Conforme a la Orden Administrativa Unilateral (la "UAO") emitida por la Agencia de Protección Ambiental de Estados Unidos ("EPA"), Expediente No. RCRA 7003-09-2024-0001 y CERCLA 106-09-2024-05, a Chiquita Canyon, LLC (CCL), CCL responde al Aviso de Deficiencia y Aclaración de la Posición de la EPA Sobre la Extensión del Área Cubierta del Vertedero de Chiquita Canyon (el Aviso) de la EPA del 13 de enero de 2026 sobre el Plan de Trabajo de Acción de Remoción (RAW) preliminar revisado de CCL para la Extensión del Área Cubierta. CCL presentó el RAW preliminar revisado a la EPA el 3 de octubre de 2025, conforme a la UAO. El RAW preliminar revisado también se presentó en conformidad con la sección 5.3 de la Determinación de Peligro Inminente y Sustancial y Orden del Departamento de Control de Sustancias Tóxicas (DTSC) de California emitida a CCL el 2 de abril de 2025 (la Orden ISE) y la Medida de Mitigación 4.1 de la Orden de Cumplimiento del 1 de mayo de 2025 (la Orden de Cumplimiento) emitida por el Programa de Gestión de Desechos Sólidos del Departamento de Salud Pública del Condado de Los Ángeles que actúa como Agencia de Cumplimiento Local (la LEA).

El RAW preliminar revisado detalló el proceso y el programa estimado para instalar otra cubierta de geomembrana (EVOH/HDPE de 60 milésimas de pulgada) y complementa la cubierta de geomembrana de 45.9 acres de 30 milésimas de pulgada y 40 milésimas de pulgada existente en el Vertedero de Chiquita Canyon (el Vertedero). El RAW preliminar revisado estimaba la instalación de otra cubierta de geomembrana en los Segmentos 1 y 2 en septiembre de 2025; en el Segmento 3 en noviembre de 2025; y en los Segmentos 4 a 15 para noviembre de 2026. Los plazos para el despliegue de cubierta de geomembrana adicional en los Segmentos 16 a 20 se identificaron como A ser determinados. En respuesta a las cartas con comentarios del DTSC y de la LEA, CCL actualizó su programa de instalación para estimar la terminación de 100 acres de cubierta de geomembrana desplegada para aproximadamente el 31 de julio de 2027, sujeto a las condiciones reales del Vertedero.

CCL recibió el Aviso de la EPA el 13 de enero de 2026 que le indica a CCL que actualice la sección 3.2 del RAW preliminar revisado. La sección 3.2 detalla el programa de despliegue de cubierta de geomembrana de CCL. El 15 de enero de 2026 CCL solicitó una reunión con la EPA para "analizar la implementación de estos

Respuesta de Chiquita Canyon, LLC al Aviso de Deficiencia de la EPA

5 de febrero de 2026

Página 2 de 8

requerimientos y para asegurar el cumplimiento de las directivas de la EPA, de la LEA y del DTSC" según el Aviso de la EPA. El 30 de enero de 2026, la EPA, junto con el DTSC, la LEA y otras varias agencias estatales y locales, se reunieron con CCL para conversar sobre la extensión de la cubierta de geomembrana y los desafíos asociados a la programación. La EPA y CCL pudieron conversar sobre la implementación de los requerimientos de la EPA de forma productiva, mientras que las agencias estatales y locales rechazaron ofrecer comentarios durante la conversación.

CCL ha documentado en varias cartas presentadas a sus reguladores los desafíos climáticos, de seguridad y logísticos de desplegar la cubierta de geomembrana a un ritmo más rápido. CCL incorpora estas cartas como referencia y le sugiere a la EPA que las revise para más detalles. Por practicidad, CCL proporciona estas cartas como los siguientes Adjuntos a esta respuesta:

- **Adjunto A:** Respuesta de Chiquita Canyon, LLC al Requerimiento de la EPA de EE.UU., del DTSC y de la LEA de Expandir la Cubierta de Geomembrana, con fecha 15 de agosto de 2025.
- **Anexo B:** Solicitud de Chiquita Canyon, LLC de Demorar el Despliegue de la Parte Final del Segmento 3 de la Cubierta de Geomembrana - Determinación de Peligro Inminente y Sustancial y Orden del DTSC sobre el Asunto del Vertedero de Chiquita Canyon, Expediente No. HSA-FY24/25-082, con fecha 28 de octubre de 2025.
- **Anexo C:** Respuesta de Chiquita Canyon, al Programa de Despliegue de Cubiertas de Geomembrana Actualizado del DTSC - Determinación de Peligro Inminente y Sustancial y Orden del DTSC sobre el Asunto del Vertedero de Chiquita Canyon, Expediente No. HSA-FY24/25-082, con fecha 7 de noviembre de 2025.
- **Anexo D:** Respuestas de Chiquita Canyon, LLC a los Comentarios del DTSC sobre el Plan de Trabajo Preliminar para la Acción de Remoción: Proteger la Celda 8A de Intrusión de Evento de Vertedero de Temperatura Elevada - Determinación de Peligro Inminente y Sustancial y Orden del DTSC sobre el Asunto del Vertedero de Chiquita Canyon, Expediente No. HSA-FY24/25-082, con fecha 21 de noviembre de 2025.
- **Adjunto E:** Respuestas de Chiquita Canyon, LLC a los Comentarios de la LEA sobre el Plan de Trabajo Preliminar Revisado para la Acción de Remoción: Extensión del Área Cubierta - Orden de Cumplimiento de la LEA, 1 de mayo de 2025 con fecha 15 de diciembre de 2025.
- **Adjunto F:** Respuesta de Chiquita Canyon, al Aviso de Determinación de Propuesta de Incumplimiento con la Determinación de Peligro Inminente y Sustancial y Orden del DTSC sobre el Asunto del Vertedero de Chiquita Canyon, Expediente No. HSA-FY24/25-082, con fecha 12 de enero de 2026.

Los Adjuntos ilustran la complejidad de los problemas de programación asociados al despliegue de la cubierta de geomembrana, que incluyen el desafío de coordinar el cumplimiento para completar las órdenes y las directivas de varios reguladores. Mientras que CCL comprende que la EPA pretendió hablar solo por sí misma en el Aviso, CCL solicita respetuosamente que la EPA considere ejercitar su autoridad para dirigir un esfuerzo coordinado razonable con las agencias estatales y locales.

CCL responde a cada una de las deficiencias identificadas por la EPA en el Aviso a continuación.

Respuesta de Chiquita Canyon, LLC al Aviso de Deficiencia de la EPA

5 de febrero de 2026

Página 3 de 8

- a. *CCL ordenará inmediatamente el material para la instalación de aproximadamente 46 acres de cubierta de geomembrana para el segmento del Grupo C.*

CCL no prevé quedarse sin material para la instalación de aproximadamente 46 acres de cubierta de geomembrana para el segmento del Grupo C. CCL actualmente tiene una cantidad importante de rollos de geomembrana (que deberían cubrir más de 40 acres) guardados en el sitio, en tres áreas separadas. Sin embargo, CCL destaca que guardar esta cantidad de material para la instalación de cubierta de geomembrana en el sitio es desafiante debido al bulto y a la dificultad de manejo del material y en cantidades suficientes podría ser contraproducente. No obstante, CCL puede comprometerse a asegurar de tener un suministro adecuado de material para la instalación de cubierta antes de los despliegues programados.

- b. *CCL se asegurará de haber ordenado suficiente material de cubierta de geomembrana para realizar reparaciones a la cubierta de geomembrana existente en el caso de que se posponga la instalación de cubierta de geomembrana nueva debido a problemas climáticos importantes.*

CCL posee suficiente material para la instalación de cubierta de geomembrana en el sitio para realizar reparaciones en la cubierta de geomembrana existente. CCL reitera el desafío de guardar esta cantidad de material en el sitio. Incluso así, CCL no prevé quedarse sin material para la instalación de cubierta de geomembrana para propósitos de realizar reparaciones en la cubierta de geomembrana existente. CCL pretende mantener un suministro adecuado de material para la instalación de cubiertas que le permitirá lograr el cumplimiento de los plazos.

- c. *CCL mantendrá suficiente dotación de personal y equipos para colocar la cubierta en áreas preparadas y preparar el siguiente segmento previsto paralelamente, donde sea técnicamente viable.*

Como la práctica de CCL es desplegar la cubierta, CCL ha mantenido y continuará manteniendo suficiente cantidad de personal y equipos para desplegar el material de instalación de la cubierta de geomembrana sobre áreas preparadas y preparar el siguiente segmento previsto paralelamente, donde sea técnicamente viable y si la seguridad lo permite.

CCL destaca que desplegar la cubierta de geomembrana de forma expeditiva no es simplemente una cuestión de traer todas las plataformas de perforación y grupos de colocadores de revestimiento que puedan entrar físicamente al sitio para hacer toda la obra al mismo tiempo. Sino que un despliegue seguro y efectivo de las cubiertas requiere trabajar deliberada y meticulosamente para no interrumpir la infraestructura de biogás y otras medidas de mitigación existentes. Emplear más equipos de trabajo podrá dar como resultado peligros ocupacionales y problemas de salud y seguridad que podrían complicar la eficacia del proceso de despliegue de la cubierta de geomembrana e interrumpir temporalmente otras medidas de mitigación que haya puestas en práctica. Para mantener la integridad de la infraestructura de gas y las medidas de mitigación existentes, CCL debe desplegar la cubierta de geomembrana a un paso atento y deliberado, mientras continúa trabajando lo más expeditivamente posible para evitar demoras.

También debe haber una comunicación constante y efectiva entre el despliegue del revestimiento, la preparación del suelo, las tuberías, las bombas, los sistemas eléctricos y otros grupos de trabajo cercanos, para desplegar la cubierta de geomembrana lo más expeditivamente posible. Aumentar la cantidad de grupos de trabajo y equipos en el sitio implica desafíos logísticos y de comunicación que podrían dar como resultado contratiempos que hagan que el despliegue sea más lento. Considerando el trabajo extremadamente meticuloso y delicado requerido para asegurar que los equipos y la infraestructura no se dañen, la utilización actual de CCL de grupos de trabajo del revestimiento y equipos es el punto de equilibrio óptimo que maximiza la eficiencia y la conveniencia y al mismo tiempo factorizar

Respuesta de Chiquita Canyon, LLC al Aviso de Deficiencia de la EPA

5 de febrero de 2026

Página 4 de 8

desafíos logísticos y mantener una comunicación constante y efectiva.

CCL también está evaluando continuamente formas de mejorar el proceso para aumentar la eficiencia, la efectividad y la seguridad. CCL actualmente está evaluando un nuevo modelo de despliegue orientado a los contornos naturales del Vertedero como forma de mejorar el proceso de instalación. Este modelo no siempre se alinearía con segmentos delineados, pero podría permitir una instalación más expeditiva.

d. CCL actualizará el programa para la instalación de la cubierta de geomembrana de la siguiente manera:

i. CCL planificará y alcanzará un índice de instalación promedio mínimo de 10 acres cada cuatro semanas durante el transcurso de cualquier período de temporada que no sea de lluvia; y

La instalación de la cubierta a un ritmo de 10 acres cada cuatro semanas es un programa agresivo. Lograr un índice de instalación de cubiertas de geomembrana promedio mínimo de 10 acres cada cuatro semanas será desafiante, debido a una multitud de condiciones climáticas, de seguridad y logísticas que podrían surgir en cualquier punto durante el despliegue, como se explicó en numerosas comunicaciones previas y como se detalla aún más en esta respuesta. CCL, de todas formas, se responsabiliza en planificar un índice de instalación de cubierta de geomembrana promedio mínimo de 10 acres cada cuatro semanas durante el transcurso de cualquier período que no sea en temporada de lluvias, comprendiendo que esto es algo a lo que se va a aspirar y no está previsto que suplante las consideraciones de salud, seguridad y técnicas en el campo.

ii. CCL actualizará los plazos para completar la instalación de la extensión de cubierta de geomembrana del Grupo C para antes del 1 de diciembre de 2026, sujeto a los siguientes procedimientos y aprobación de la extensión:¹

1. Por lo menos cinco (5) días antes de cualquier fecha que CCL espere razonablemente que habrá un evento de tormenta de suficiente magnitud que no permita que CCL continúe de forma segura la obra de instalación de cubierta de geomembrana, CCL podrá solicitar una extensión de la EPA al plazo del 1 de diciembre de 2026 para completar la instalación de la extensión de la cubierta de geomembrana del Grupo C. En su solicitud de extensión, CCL especificará la duración durante la cual CCL propone suspender más instalaciones de cubierta de geomembrana debido a climas adversos.

CCL tiene la voluntad de actualizar el plazo objetivo para completar la instalación de la cubierta de geomembrana del Grupo C antes del 1 de diciembre de 2026, sujeto a lo siguiente.

Demoras por Condiciones Climáticas, Seguridad y Logística

CCL comparte el objetivo de la EPA de extender la cubierta de geomembrana lo más expeditivamente posible con la intención de planificar y hacer todo lo posible por alcanzar un índice de instalación de cubiertas de geomembrana mínimo promedio de 10 acres cada cuatro semanas. CCL espera que este objetivo compartido le reasegure a la EPA que CCL se tomará muy en serio cualquier demora en el despliegue. Al mismo tiempo, deben considerarse la seguridad y la eficacia para asegurar que el

¹ Nota al pie de la comunicación de la EPA: "Si CCL propone un plazo para completar la instalación de la cubierta de geomembrana del Grupo C en o antes del 1 de diciembre de 2026 (ej. para cumplir con la directiva de otra agencia), la EPA también consideraría que este plazo estaría cumpliendo con esta directiva".

Respuesta de Chiquita Canyon, LLC al Aviso de Deficiencia de la EPA

5 de febrero de 2026

Página 5 de 8

despliegue de la cubierta de geomembrana sea no solo efectivo sino que no cause ninguna lesión o daño.

Para ayudar a la EPA a comprender el alcance de las condiciones climáticas, de seguridad y logísticas que podrían demorar el despliegue de la cubierta, CCL proporciona la siguiente lista no exhaustiva de problemas y condiciones que podrían surgir en cualquier punto durante el despliegue y dificultar el progreso o impedir que se retome el despliegue. CCL solicita que esta lista forme la base para extender automáticamente el plazo del 1 de diciembre de 2026, como se explica en detalle a continuación.

- Problemas de acceso (ej. la necesidad de construir nuevas calles de acceso, imposibilidad de llegar a los equipos debido a suelo inundado y a superficies resbaladizas, etc.).
- Proyectos que compiten entre sí²
- Cambios en la disponibilidad de contratistas y en los grupos de colocadores de revestimientos
- Reparaciones de equipos (ej. plataformas de perforación)
- Reparaciones en la infraestructura (ej. cabezales, pozos, bombas, laterales, tuberías a presión, líneas eléctricas, paneles, etc.).
- La necesidad de reubicar infraestructura (ej. oxidantes térmicos, limpieza de bombas y reparación de equipos, remolques y oficinas de contratistas, etc.).
- Condiciones climáticas poco seguras (ej. climas húmedos, ráfagas de viento, vientos sostenidos, etc.).
- Condiciones inapropiadas del sitio (ej. suelo inundado, calles inaccesibles, etc.).
- Emergencias
- Evacuaciones
- Fuerza Mayor
- Otros motivos que determinen los superintendentes y capataces de CCL, de buena fe, con criterio en el campo, que impiden el despliegue.

Aviso

Por su naturaleza, estas condiciones son condiciones que surgen con poco aviso o sin aviso y deben ser evaluadas al momento del despliegue. Por lo tanto, CCL no puede comprometerse a proporcionar por un aviso de por lo menos cinco días para demorar el despliegue de la cubierta de geomembrana y CCL tampoco puede comprometerse a especificar la duración durante la cual podría necesitar demorar el despliegue aún más.

Proporcionar un aviso en base a los informes climáticos que no sean específicos del sitio y predecir condiciones adecuadas para el despliegue de la geomembrana, por ejemplo, no es una propuesta viable. Los informes y los pronósticos climáticos se realizan con datos fuera del sitio y generalmente son inexactos para la zona donde se toman los datos y no pueden representar las condiciones del sitio que cambian constantemente. Mientras que las condiciones para el despliegue pueden ser aceptables para el supervisor a la mañana, podrán ser peligrosas para la tarde. Los informes y los pronósticos climáticos no pueden desplazar estas llamadas a criterio hora por hora que pueden representar la seguridad de los equipos de trabajo y la instalación efectiva de la cubierta por encima de cualquier otra cosa.

Además, los informes y pronósticos climáticos no capturan las características geográficas

² Por ejemplo, el otoño pasado, Chiquita perforó nuevas sondas de monitoreo de temperatura (TMPs) e instaló termocuplas en cada una. Estas TMPs estaban en la misma zona en la que se iba a desplegar la cubierta de geomembrana adicional. Esto causó la necesidad de pausar el proceso de despliegue de la cubierta hasta que se complete la instalación de termocuplas en cada TMP.

Respuesta de Chiquita Canyon, LLC al Aviso de Deficiencia de la EPA

5 de febrero de 2026

Página 6 de 8

y geológicas que frecuentemente amplifican los efectos de las condiciones climáticas adversas. Por ejemplo, los informes y los pronósticos climáticos podrían indicar que el viento está soplando a una velocidad de ciertas millas por hora. En el Vertedero, los cañones y los valles que forman la propiedad (y le dan al Vertedero parte de su nombre) exacerban las condiciones ventosas, haciendo que los vientos que podrían estar soplando de alguna manera a una milla por hora previsible giren a velocidades más rápidas que puedan interrumpir la instalación en la cubierta superior del Vertedero. Los informes y pronósticos climáticos tampoco factorizan las ráfagas de viento, que tampoco permiten el despliegue de la cubierta de geomembrana.

En lugar de depender de los informes y los pronósticos climáticos, CCL depende del mejor criterio profesional de los superintendentes y capataces de sus equipos de colocadores de revestimiento para tomar decisiones en el campo relacionadas con la seguridad y sobre si es apropiado o no desplegar la cubierta de geomembrana en un momento y lugar determinados. CCL se responsabiliza en documentar las decisiones diarias de los superintendentes y capataces sobre el despliegue en el campo y de compartirlas con la EPA en la actualización semanal de la instalación de las cubiertas. Sin embargo, es muy importante que CCL tenga permitido continuar dependiendo del buen criterio y experiencia de los colocadores de revestimiento y de los capataces para determinar si debe ocurrir el despliegue o no.

Este modelo representa de forma apropiada las condiciones reales en el sitio y otros detalles al momento del potencial despliegue.

2. *La EPA podrá otorgar una o más extensiones al plazo del 1 de diciembre de 2026 para permitirle a CCL posponer la obra de instalación de la nueva cubierta de geomembrana en base a las consideraciones de seguridad.*

CCL agradece la voluntad de la EPA de otorgar extensiones al plazo del 1 de diciembre de 2026 para asegurarse de que CCL despliegue la cubierta de geomembrana únicamente cuando sea seguro y apropiado hacerlo. Como ya tiene conocimiento la EPA, CCL ya prevé la probable necesidad de solicitar una o más extensiones. CCL desea volver a revisar su propuesta de la reunión del 30 de enero de 2026 que indica que cualquiera de los motivos previamente mencionados que demorarían el despliegue de la cubierta de geomembrana constituirían motivos para una extensión automática de la EPA que sea proporcional al período de demora (ej. dos días de demora serían equivalentes a una extensión de dos días). CCL le informaría a la EPA estos impactos en el programa en las actualizaciones semanales de las instalaciones de las cubiertas. Este método de extensión automática optimizaría mucho el proceso de instalación de cubiertas de geomembrana desde un punto de vista administrativo, facilitando la carga tanto en la EPA como en el equipo de CCL.

CCL no propone este proceso para desplazar la autoridad de la EPA de ajustar el programa razonablemente de cualquier manera. Este proceso simplemente establecería algo predeterminado que represente las realidades de la obra en el campo sin necesidad de que la EPA enfoque recursos continuamente en impactos previstos conocidos. Si ante una mayor revisión de un evento o serie de eventos específicos que causaron una demora en el despliegue, la EPA determinara que sería apropiado un ajuste alternativo al plazo que difiera del proceso predeterminado, podría informarle esa fecha actualizada a CCL.

3. *Si CCL suspende cualquier trabajo de instalación de cubierta de geomembrana, CCL realizará reparaciones en la cubierta de geomembrana existente.*

CCL ya está realizando las reparaciones necesarias en la cubierta de geomembrana existente cuando se suspende la instalación y cuando las condiciones lo permiten. CCL continuará realizando estas reparaciones cuando no esté

Respuesta de Chiquita Canyon, LLC al Aviso de Deficiencia de la EPA

5 de febrero de 2026

Página 7 de 8

desplegando cubierta de geomembrana, comprendiendo que cualquiera de los motivos arriba mencionados para demorar el despliegue de la cubierta de geomembrana podría hacer que CCL no realice reparaciones en la cubierta de geomembrana existente, dependiendo de las condiciones en las cercanías de la reparación necesaria. Por ejemplo, bajo ciertas circunstancias del viento, CCL podrá realizar reparaciones en áreas de cubiertas existentes que estén en un área diferente del Vertedero protegida de los vientos, pero no podría realizar reparaciones en ninguna zona de cubiertas afectada por los mismos vientos que induzcan suspensión.

Por lo tanto, CCL propone ajustar el texto en su plan para asegurar que las reparaciones se realicen sujetas a consideraciones de seguridad y viabilidad.

CCL espera poder analizar el modelo propuesto con la EPA y un plazo apropiado para actualizar el plan.

Si tiene preguntas, comuníquese conmigo escribiendo a kevin.green@wasteconnections.com.

Atentamente,



Kevin Green
Gerente de Distrito

Adjuntos: Adjunto A - Respuesta de Chiquita Canyon, LLC con fecha 15 de agosto de 2025
 Adjunto B - Solicitud de Chiquita Canyon, LLC con fecha 28 de octubre de 2025
 Adjunto C - Respuesta de Chiquita Canyon, LLC con fecha 7 de noviembre de 2025
 Adjunto D - Respuesta de Chiquita Canyon, LLC con fecha 21 de noviembre de 2025
 Adjunto E - Respuesta de Chiquita Canyon, LLC con fecha 15 de diciembre de 2025
 Adjunto F - Respuesta de Chiquita Canyon, LLC con fecha 12 de enero de 2026

cc: Amy Miller, Agencia de Protección Ambiental de Estados Unidos
 Joel Jones, Agencia de Protección Ambiental de Estados Unidos
 Roshni Brahmbhatt, Agencia de Protección Ambiental de Estados Unidos
 Rick Sakow, Agencia de Protección Ambiental de Estados Unidos
 Mark Anthony Relon, Agencia de Protección Ambiental de Estados Unidos
 Tara Frost, Agencia de Protección Ambiental de Estados Unidos
 Tyler Holybee, Agencia de Protección Ambiental de Estados Unidos
 Todd Thalhamer, CalRecycle
 Alana Mathews, Agencia de Protección Ambiental de California
 Sophia Carrillo, Agencia de Protección Ambiental de California
 Todd Sax, Agencia de Protección Ambiental de California

Respuesta de Chiquita Canyon, LLC al Aviso de Deficiencia de la EPA

5 de febrero de 2026

Página 8 de 8

Scott Lichtig, Agencia de Protección Ambiental de California
Karen Gork, Agencia de Cumplimiento Local
Eric Morofuji, Agencia de Cumplimiento Local
Thanne Berg, Departamento de Control de Sustancias Tóxicas
Tim Crick, Departamento de Control de Sustancias Tóxicas
Peter Ruttan, Departamento de Control de Sustancias Tóxicas
Christopher Kane, Departamento de Control de Sustancias Tóxicas
Johnathon Crook, Departamento de Control de Sustancias Tóxicas
Bridget Floyd, Departamento de Control de Sustancias Tóxicas
David Sadwick, Departamento de Control de Sustancias Tóxicas
Colleen Flannery, Ministerio de Justicia de California
Donald Robinson, Ministerio de Justicia de California
Nicholas Moore, Ministerio de Justicia de California
Ross Hirsch, Ministerio de Justicia de California
Sarah Phillips, Chiquita Canyon
John Perkey, Chiquita Canyon
Jim Little, Chiquita Canyon
Kurt Shaner, Chiquita Canyon
Megan Morgan, Beveridge & Diamond
Nicole Weinstein, Beveridge & Diamond

ATTACHMENT A



CHIQUITA CANYON

A Waste Connections Company

August 15, 2025

Via E-Mail

Amy Miller-Bowen
Director
Enforcement and Compliance Assurance
Division Director
U.S. Environmental Protection Agency,
Region 9
75 Hawthorne St.
San Francisco, CA 94105
Miller.Amy@epa.gov

Michael Montgomery
Director
Superfund and Emergency Management
Division
U.S. Environmental Protection Agency,
Region 9
75 Hawthorne St.
San Francisco, CA 94105
Montgomery.Michael@epa.gov

Liza Frias
Director
Environmental Health
Los Angeles County Department of Public
Health
5050 Commerce Drive
Baldwin Park, CA 91706
lfrias@ph.lacounty.gov

Eric Morofuji
Solid Waste Management Branch
Engineering Support Branch
Los Angeles County Department of Public
Health
1001 I Street
Sacramento, CA 95814
emorofuji@ph.lacounty.gov

Elizabeth Berg, Deputy Director
Daniel Ziarkowski, Branch Chief
Peter Ruttan, Project Manager
Site Mitigation and Restoration Program
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826
Thanne.berg@dtsc.gov
Dan.ziarkowski@dtsc.gov
Peter.ruttan@dtsc.gov

**Re: Chiquita Canyon, LLC's Response to U.S. EPA's, DTSC's, and the LEA's
Requirement to Expand the Geomembrane Cover**

Dear Director Miller-Bowen, Director Montgomery, Director Frias, Ms. Berg, Mr. Ziarkowski,
Mr. Ruttan, and Mr. Morofuji:

Chiquita Canyon, LLC ("CCL") provides this written response to the U.S. Environmental
Protection Agency's ("EPA") July 24, 2025 letter, "additional work required under UAO for

geomembrane cover expansion”.¹ The letter directs CCL to implement additional work under Paragraph 90 of the Unilateral Administrative Order, EPA Docket No. RCRA 7003-09-2024-0001 and CERCLA 106-09-2024-05, In the Matter of Chiquita Canyon, LLC issued February 21, 2024 (“UAO”) by EPA. CCL also responds to the LEA May 1, 2025 Compliance Order and DTSC April 1, 2025 Imminent and Substantial Endangerment Order, which have also directed CCL to expand the existing geomembrane cover. CCL is responding to the Agencies together to ensure transparency and foster consistency across the orders and directives.

As we have discussed with the Agencies, including at an August 5, 2025 meeting with EPA, CCL wants to be clear—it is committed to expanding the geomembrane cover. In recognition of the importance in getting additional geomembrane cover installed, as discussions with the Agencies to finalize appropriate work plans continue, we have been moving forward with ordering approved geomembrane cover, prepping soil for the installation of cover, and installing additional cover. CCL is executing its initial phase to add 15 acres of geomembrane cover and is currently working on the installation of the first 5 acres of this initial geomembrane cover expansion. While implementing this first phase, CCL is developing a work plan for phased installation of additional geomembrane cover. CCL provides an overview of its proposed approach here, further detail on which will be provided in CCL’s subsequent submission.

A. Phased Cover Installation Proposal

CCL agrees to install additional geomembrane cover. The installation will proceed in a phased approach, which is critical for ongoing management of the elevated temperature landfill (“ETLF”) event. In order to install a section of cover, all landfill gas extraction wells in that section must be taken offline for approximately two weeks. This means that the wells taken offline will not extract gas for approximately two weeks. In addition, during that time period, the pumps are also taken offline, which means liquid extraction in the area of these offline wells will be impacted. Even temporary cessation of extraction will have an immediate, measurable impact. As CCL is installing the first 5 acres of cover, it is already seeing increased temperatures at nearby temperature monitoring probes. Approximately 15 wells were taken offline last week in preparation for the cover installation. The nearby temperature monitoring data from TMP 11 showed an immediate 23 degree increase at the 30-foot thermocouple and a 17 degree increase at the 45-foot thermocouple this week as a result, as reported to the LEA on 8/14/25. It is therefore imperative that the cover continue to be installed in stages to minimize impact on reaction mitigation efforts.

To that end, CCL proposes to first complete the installation of the initial 15 acres of cover in approximately 5-acre segments. *See* Attachment A (map of proposed phases). We expect to finish this initial 15 acres before the rainy season begins in November. During the rainy season, limited installation activities can occur. Before installation of additional cover, the area to be covered needs to be prepared in advance and properly graded. If a rainstorm occurs during this process, the prep work will need to be redone. Proceeding with this work would have a high risk of lengthening the time during which wells are offline. Instead, to continue making progress during the rainy season, CCL proposes to conduct repairs on approximately 16.4 acres of

¹ Nothing in this letter shall be construed to limit the rights, claims, and defenses CCL may have against EPA, DTSC, the LEA or any other person in complying with the applicable letters, orders, or in any future action.

existing cover. See Attachment B (map of repair area). Repair work does not require the same grading, so it is less susceptible to weather disruptions. This work would focus on portions of the existing cover where odors may still be present. The existing cover is placed over an area of the Landfill known to be impacted by the reaction. Repairs to the cover will provide tangible results in decreasing potential emissions.

Following the rainy season and completion of repairs as outlined above, CCL would then install the cover on the 5-acre tracts delineated in CCL’s Draft Remedial Action Workplan (“RAW”), designated here with an “A” on the figure in Attachment A, followed by area “B.” Each of these areas is approximately 30 acres, for a total of approximately 60 acres. Again, each area would be installed in approximately 5-acre segments. CCL anticipates completion of these additional segments in 2026 before the rainy season begins in November.

Following expansion of the cover to areas “A” and “B,” CCL proposes to move forward with installation of geomembrane cover over the areas designated as “C” on the attached map. This area encompasses approximately 25 acres and would again be installed in approximately 5-acre segments. The timing of installation of geomembrane cover over area “C” is more challenging to anticipate, but CCL will continue coordination with the Agencies on that timing. In total, the areas CCL proposes, subsequent to the initial deployment already underway, would encompass approximately 85 acres. Further detail on these areas would be included in the revised RAW. Timing would be further discussed with the Agencies after completion of areas “A” and “B.” Some flexibility in the work plan and timing will be critical, to allow for adjustments accounting for evolving onsite conditions. For example, after completion of area “B,” if site conditions have changed and impacted cover priorities, CCL would reevaluate and reprioritize remaining areas to be covered.

CCL Proposed Cover Installation and Repair Plan

Phase	Estimated Area / Acreage	Estimated Timing
Install initial cover	Initial 15 acres	By November 2025
Conduct repairs on existing cover	16 acres	November 2025 – April 2026
Install cover in area A	30 acres	By November 2026
Install cover in area B	30 acres	By November 2026
Install cover in area C	25 acres	TBD

B. Next Steps

As discussed at the August 5th meeting with EPA, CCL wants to ensure that the parties share a common understanding of the unique challenges associated with the reaction and its management. We appreciate EPA’s willingness to connect CCL directly with EPA’s experts on ETLF events so that we can move forward with a technically sound and effective approach.

As CCL has previously stated in communications with the Agencies, it disagrees with a number of the underlying characterizations made by some of its regulators regarding the nature and extent of the reaction occurring at the site. However, CCL does not believe this letter is the appropriate forum to address these factual disagreements and instead wants to focus on our

shared goal of the appropriate management of the reaction and mitigation of any impacts to the surrounding community and the environment. We look forward to discussing these issues further with EPA's experts at an appropriate time.

CCL appreciates the Agencies meeting and conferring regarding the schedule and additional follow up. CCL is committed to installing additional geomembrane cover in coordination with the Agencies, using a thoughtful, deliberate approach that balances the benefits of odor control with the ongoing needs of addressing the reaction.

CCL will provide a response to the LEA regarding the proposed cover on August 18, 2025, with a copy to EPA and DTSC.

Although CCL initially expected to have a plan ready by August 30, 2025, CCL received extensive comments from DTSC on August 4, 2025. CCL now understands DTSC to prefer receiving the update as a part of a single package, which will not be feasible by August 30th. CCL is therefore working with DTSC to establish an appropriate deadline for the updated plan. CCL appreciates the Agencies' willingness to coordinate for a consistent approach across the orders, and will ensure that the LEA and EPA are notified of the new deadline, and copied when the plan is ultimately submitted.

As discussed at the August 5th meeting with EPA, once we receive approval from all relevant agencies of this work plan, we will also update the cost estimate submitted to EPA under the UAO, including responding to the questions and comments received from EPA on July 30, 2025.

Please contact me if you have any questions or would appreciate additional materials in considering this information.

Regards,



Steve Cassulo
District Manager
Chiquita Canyon, LLC

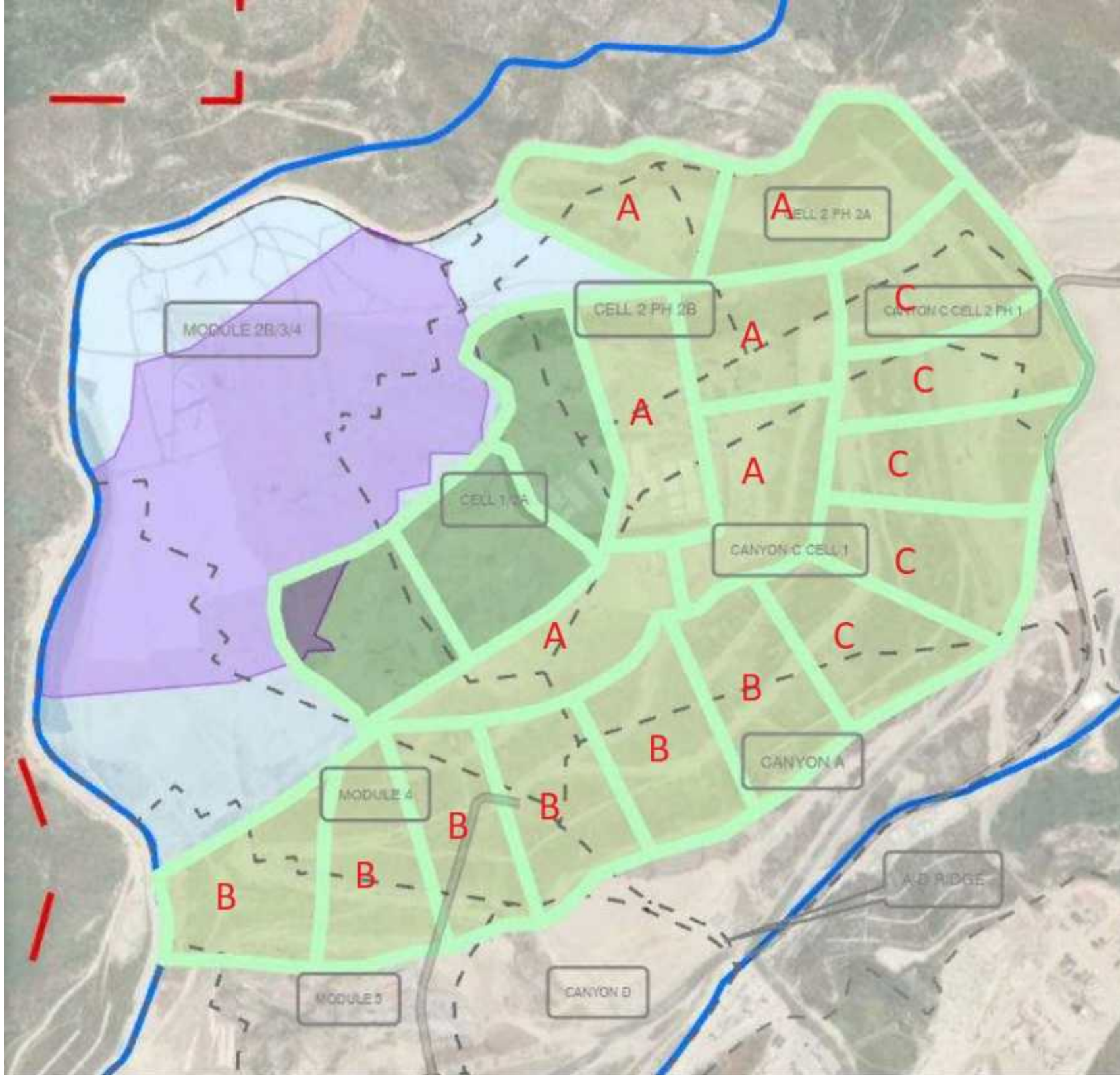
Attachments

cc:

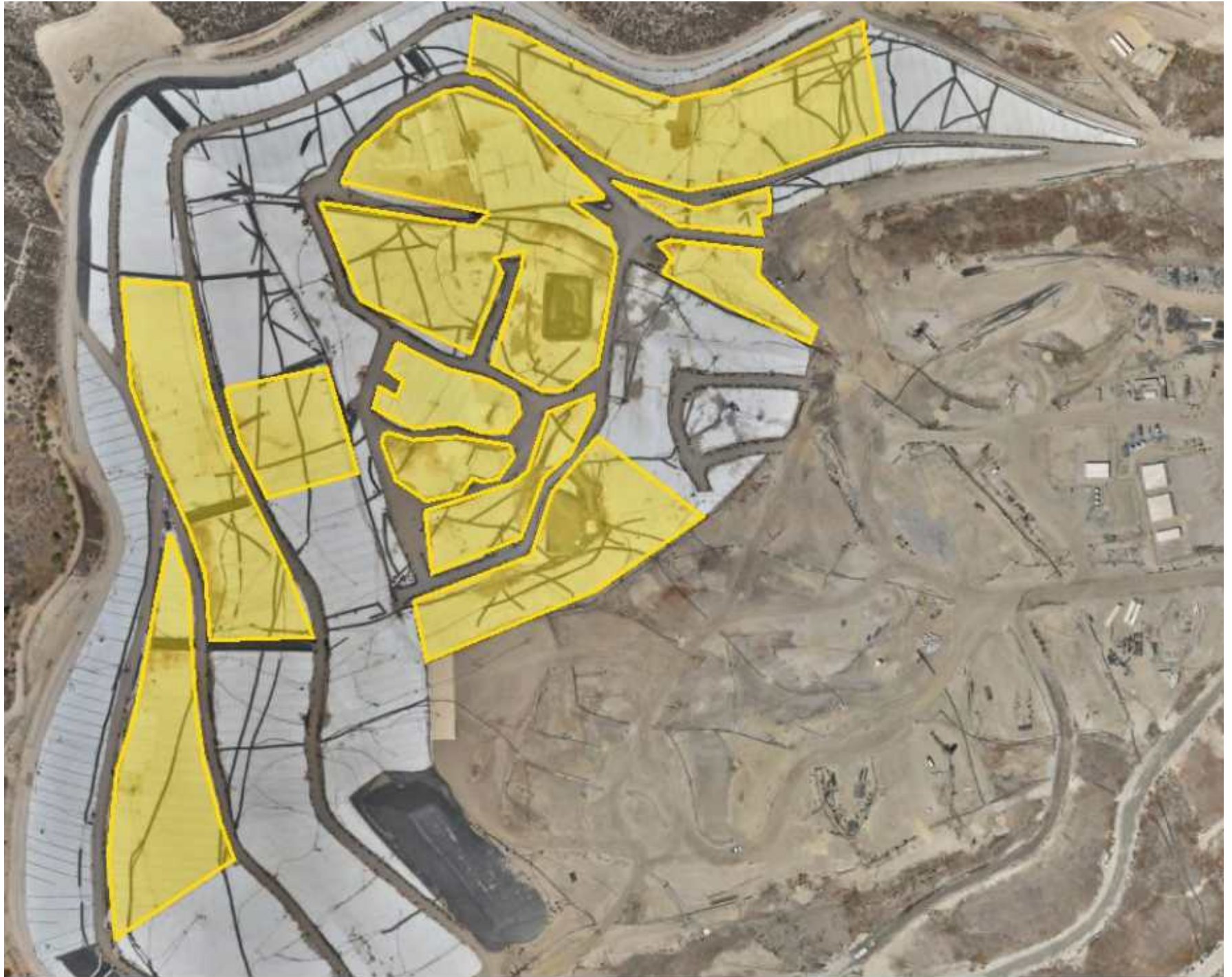
Joel Jones, United States Environmental Protection Agency
Roshni Brahmhatt, United States Environmental Protection Agency
Kaoru Morimoto, United States Environmental Protection Agency
Rick Sakow, United States Environmental Protection Agency
Tyler Holybee, United States Environmental Protection Agency

Mark Anthony Relon, United States Environmental Protection Agency
Tara Frost, United States Environmental Protection Agency
Laura Friedli, United States Environmental Protection Agency
Ken Habaradas, Los Angeles County LEA
Shikari Nakagawa-Ota, Los Angeles County LEA
Renee Jensen, LEA Counsel
Joshua Wirtschafter, United States Environmental Protection Agency
Yana Garcia, California Environmental Protection Agency
Todd Sax, California Environmental Protection Agency
Tim Crick, Department of Toxic Substances Control
Diane Barclay, Department of Toxic Substances Control
Christopher Kane, Department of Toxic Substances Control
Johnathon Crook, Department of Toxic Substances Control
Lisa Winebarger, Department of Toxic Substances Control
Colin Kelly, Department of Toxic Substances Control
David Sadwick, Department of Toxic Substances Control
John Perkey, Chiquita Canyon
Dylan Smith, Chiquita Canyon
Sarah Phillips, Chiquita Canyon
Megan Morgan, Beveridge & Diamond
Heidi Knight, Beveridge & Diamond
Nicole Weinstein, Beveridge & Diamond

Attachment A



Attachment B



ATTACHMENT B



October 28, 2025

Via E-Mail

Daniel V. Ziarkowski, Branch Chief
Peter Ruttan, Project Manager
Department of Toxic Substances Control
Site Mitigation and Restoration Program
Legacy Landfills Office
8800 Cal Center Drive
Sacramento, CA 95826
dan.ziarkowski@dtsc.ca.gov
peter.ruttan@dtsc.ca.gov

Re: Chiquita Canyon, LLC – Request to Delay Deployment of Final Portion of Segment 3 of the Geomembrane Cover – DTSC Imminent and Substantial Endangerment Determination and Order, In the Matter of Chiquita Canyon Landfill, Docket No. HSA-FY24/25-082

Dear Mr. Ziarkowski and Mr. Ruttan:

Chiquita Canyon, LLC (Chiquita) submits this letter requesting to delay deployment of the final portion of Segment 3 of the 60-mil EVOH/HDPE geomembrane cover as illustrated in Figure 3 of Chiquita's revised draft Extension of Covered Area Removal Action Workplan (RAW) pursuant to the Imminent and Substantial Endangerment Determination and Order issued by the Department of Toxic Substances Control (DTSC) to Chiquita on April 2, 2025 (the Order) (see **Attachment A** for Figure 3).

Chiquita submitted the revised draft RAW on October 3, 2025 pursuant to sections 5.3 and 5.4 of the Order. The revised draft RAW details the process of installing additional geomembrane cover contiguous with the existing 30-mil HDPE geomembrane cover to extend the area of the Chiquita Canyon Landfill (Landfill) provided with a geomembrane cover. The revised draft RAW estimated completion of the deployment of Segment 3 of the geomembrane cover in November 2025.

As of October 17, 2025, Chiquita had completed installation of Segment 1, Segment 2, and part of Segment 3, comprising approximately 655,140 square feet of the 60-mil EVOH/HDPE geomembrane cover, on the top deck of the Landfill. The final portion of Segment 3 to be deployed will comprise approximately 1.7 acres of the 60-mil EVOH/HDPE geomembrane cover.

While preparing to deploy the final portion of Segment 3, Chiquita encountered timing and access issues caused by other compliance projects ongoing at the site. Deployment of the final portion of

Chiquita Canyon, LLC Request to Delay Deployment of Final Portion of Segment 3

October 28, 2025

Page 2 of 3

Segment 3 at this time would cut off access to the Landfill's main access road, which must remain open for access to temperature monitoring probes (TMPs) currently being installed onsite and other major areas of the Landfill. Chiquita is in the process of building new access roads on areas covered by the newly deployed EVOH/HDPE geomembrane cover to ensure continued access to major areas of the Landfill. Once this work is completed and access is no longer an issue, the final portion of Segment 3 will be deployed. Chiquita must also address drainage issues before deployment of the final portion of Segment 3 can occur. Chiquita plans to add material in the Segment 3 area to address this concern, prioritizing placement of access roads first, as described above.

Because all landfill gas (LFG) extraction wells and dewatering pumps in the area must be taken offline for a portion of the deployment of the EVOH/HDPE geomembrane cover, and therefore gas and liquid extraction will not occur in this area during this time, it is critical that Chiquita address these timing, access, and drainage issues prior to deploying the final portion of Segment 3 to properly prepare the area and minimize the impact of the offline LFG extraction wells and pumps.

In light of the issues identified above, Chiquita now anticipates that it will finish deployment of the final portion of Segment 3 by December 12, 2025. Chiquita does not intend to postpone deployment past the rainy season; however, recent wet weather conditions at the site could significantly delay activities. Chiquita provides the following updated schedule for deployment, which includes timing for preparation activities required before further deployment can commence.

Activity	Approximate Start Date	Anticipated Duration	Approximate Completion Date
Construction of new access roads	9/29/2025	6 weeks	11/10/2025
Complete installation of TMPs 36-40	10/23/2025	4 weeks	11/20/2025
Address drainage issues	11/10/2025	1 week	11/17/2025
Segment 3 Subgrade Preparation	11/14/2025	2 weeks	11/28/2025
Segment 3 geomembrane deployment	11/28/2025	2 weeks	12/12/2025
Segment 3 surface finish and LFG tie-in	12/12/2025	2 weeks	12/26/2025
Completion report	12/26/2025	4 weeks	1/23/2026

This new schedule will also enable the LFG extraction wells and pumps to be shut off for one to two days at a time rather than for the duration of the deployment of the 60-mil EVOH/HDPE geomembrane cover.

If you have any questions, please do not hesitate to reach out to me at (346) 807-5547 or Kate.Logan@WasteConnections.com.

Chiquita Canyon, LLC Request to Delay Deployment of Final Portion of Segment 3

October 28, 2025

Page 3 of 3

Sincerely,

Kate Logan

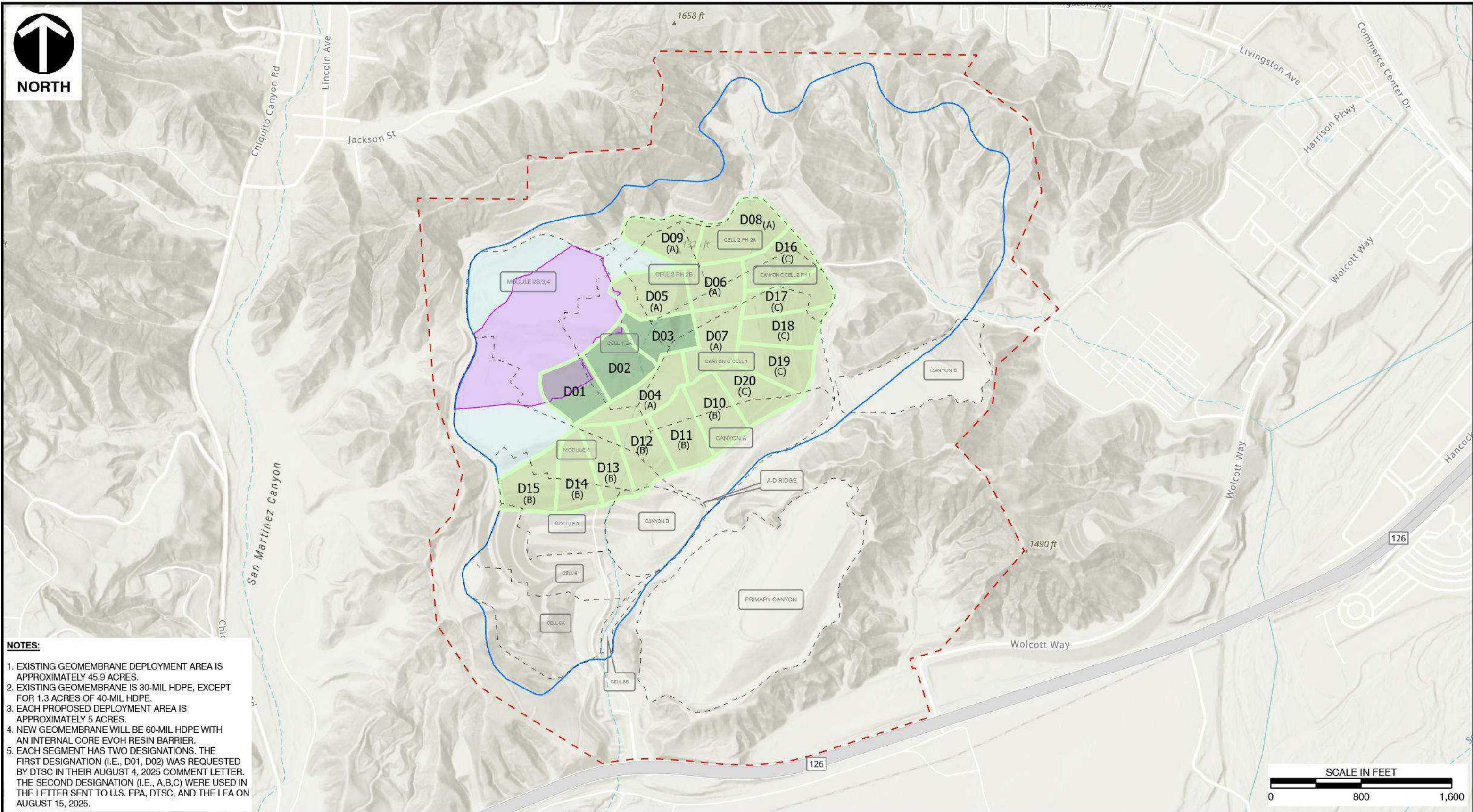
Kate Logan
Regional Engineer
Chiquita Canyon Landfill

Attachment: A – Figure 3: Proposed Geomembrane Deployment Areas

cc: Steve Cassulo, Chiquita Canyon
John Perkey, Chiquita Canyon
Dylan Smith, Chiquita Canyon
Thanne Berg, Department of Toxic Substances Control
Tim Crick, Department of Toxic Substances Control
Diane Barclay, Department of Toxic Substances Control
Christopher Kane, Department of Toxic Substances Control
Johnathon Crook, Department of Toxic Substances Control
Lisa Winebarger, Department of Toxic Substances Control
Bridget Floyd, Department of Toxic Substances Control

ATTACHMENT A

C:\Users\cmay\Documents\ArcGIS\Projects\Chiquita Canyon 2\Chiquita Canyon 2.aprx [GEOMEMBRANE DEPLOYMENT AREAS] 10/3/2025 1:55 PM (cmay)



- NOTES:**
- 1. EXISTING GEOMEMBRANE DEPLOYMENT AREA IS APPROXIMATELY 45.9 ACRES.
 - 2. EXISTING GEOMEMBRANE IS 30-MIL HDPE, EXCEPT FOR 1.3 ACRES OF 40-MIL HDPE.
 - 3. EACH PROPOSED DEPLOYMENT AREA IS APPROXIMATELY 5 ACRES.
 - 4. NEW GEOMEMBRANE WILL BE 60-MIL HDPE WITH AN INTERNAL CORE EVOH RESIN BARRIER.
 - 5. EACH SEGMENT HAS TWO DESIGNATIONS. THE FIRST DESIGNATION (I.E., D01, D02) WAS REQUESTED BY DTSC IN THEIR AUGUST 4, 2025 COMMENT LETTER. THE SECOND DESIGNATION (I.E., A,B,C) WERE USED IN THE LETTER SENT TO U.S. EPA, DTSC, AND THE LEA ON AUGUST 15, 2025.

LEGEND	
	APPROXIMATE SITE BOUNDARY
	REFUSE LIMIT
	CELL LIMIT
	EXISTING GEOMEMBRANE DEPLOYMENT AREA
	SUBSEQUENT SUPPLEMENTAL GEOMEMBRANE DEPLOYMENT AREAS
	INITIAL SUPPLEMENTAL GEOMEMBRANE DEPLOYMENT AREA
	REACTION AREA AUGUST 2025

ENGINEERING, SURVEYING AND LANDSCAPE ARCHITECTURE IN THE STATE OF NORTH CAROLINA WILL BE PROVIDED BY CEC SURVEYING AND LANDSCAPE ARCHITECTS OF NC, PLLC. SERVICES IN PUERTO RICO WILL BE PROVIDED BY CEC ENGINEERS & CONSULTANTS, LLC. LANDSCAPE ARCHITECTURE SERVICES IN THE STATE OF OHIO WILL BE PROVIDED BY CEC LANDSCAPE ARCHITECTS, LLC.



Civil & Environmental Consultants, Inc.

265 Santa Helena Suite 210
Solana Beach, CA 92075
Ph: 619.837.6555 · 800.365.2324
www.cecinc.com

DRAWN BY:	GMM	CHECKED BY:	RVH
DATE:	10/3/2025	SCALE:	1" = 800'

REMOVAL ACTION WORKPLAN
EXTENSION OF COVERED AREA
CHIQUITA CANYON LANDFILL

PROPOSED GEOMEMBRANE DEPLOYMENT AREAS

APPROVED BY:	RVH	FIGURE NO:	3
PROJECT NO:	350-750		

*Hand Signature on file

ATTACHMENT C



CHIQUITA CANYON
A Waste Connections Company

November 7, 2025

Via E-Mail

Diane Barclay, Northern California Division Chief
Site Mitigation and Restoration Program
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826
Diane.Barclay@dtsc.ca.gov

**Re: Chiquita Canyon, LLC Response to DTSC Request for Updated
Geomembrane Cover Deployment Schedule – DTSC Imminent and
Substantial Endangerment Determination and Order, In the Matter of
Chiquita Canyon Landfill, Docket No. HSA-FY24/25-082**

Dear Ms. Barclay:

Chiquita Canyon, LLC (Chiquita) submits this letter in response to the Department of Toxic Substances Control's (DTSC) October 31, 2025 email request for an updated geomembrane cover deployment schedule submitted as part of the revised draft Removal Action Workplan (RAW) for the Extension of Covered Area on October 3, 2025, pursuant to sections 5.3 and 5.4 of DTSC's Imminent and Substantial Endangerment Determination and Order issued to Chiquita on April 2, 2025 (the Order).

The revised draft RAW detailed the process and estimated schedule for installing additional geomembrane cover (60-mil EVOH/HDPE) contiguous with the existing 30-mil and 40-mil HDPE geomembrane cover at the Chiquita Canyon Landfill (Landfill). The revised draft RAW estimated installation of the additional geomembrane cover in Segments 1 and 2 in September 2025; Segment 3 in November 2025;¹ and Segments 4 through 15 by November 2026. The timing for the deployment of additional geomembrane cover in Segments 16 through 20 was identified as to be determined.

In your October 31, 2025 email request, you stated that Chiquita's "TBD" and "by November 2026" are "inadequate deadlines" and that the proposed rate of deployment was "woefully deficient." DTSC's email request additionally claimed that, "[c]onsidering the rate of expansion and Respondents' unwillingness to install a barrier or break to contain the reaction, all of the canyon is vulnerable" and therefore "Respondents need to expedite this deployment" and submit

¹ In a letter dated October 28, 2025, Chiquita requested to delay installation of the final portion of geomembrane cover in Segment 3 to December 12, 2025, due to timing and access issues caused by other compliance projects ongoing at the Landfill. DTSC granted Chiquita's request on October 31, 2025.

Chiquita Canyon, LLC Response to DTSC Request for Updated Cover Deployment Schedule

November 7, 2025

Page 2 of 4

an “updated comprehensive cover installation schedule” that includes “the full main canyon including deployment areas D16-D20, including all of cells 5, 6 and 8.”

Chiquita strongly disputes DTSC’s characterization of Chiquita’s schedule submitted as part of the revised draft RAW on October 3, 2025, and DTSC’s rationale for requiring an updated comprehensive cover installation schedule.² Chiquita’s schedule reflects an expeditious deployment timeline that accounts for the challenging realities, complicated logistics, and unknown variables, such as weather, that are beyond Chiquita’s control and can affect the pace of such an extensive installation project. Due to the complex nature of the work to deploy the geomembrane cover while minimizing impacts to other ongoing reaction mitigation efforts and the impending rainy season, Chiquita cannot at this time commit to a further expedited and detailed schedule than the schedule submitted in the revised draft RAW.³ However, as discussed in more detail below, Chiquita’s experience with deploying the additional geomembrane cover thus far has been instructive. Chiquita plans to implement lessons learned from its deployment thus far that we believe will enable us to complete installation of the geomembrane cover in a manner that reduces the risk of potential complications while continuing to manage the reaction and mitigate any potential reaction impacts.

Under the Order and per directives from DTSC, the United States Environmental Protection Agency (EPA), and the Local Enforcement Agency (LEA), Chiquita worked as expeditiously as possible to deploy the initial 15 additional acres of the geomembrane cover in Segments 1, 2, and 3 of the Landfill before the rainy season. During this initial deployment process, Chiquita had to take all landfill gas (LFG) extraction wells and dewatering pumps in the active cover deployment areas offline to complete the installation because the cover must be installed underneath the existing piping and infrastructure, requiring removal of portions of the piping to enable installation access. As a result of taking all LFG extraction wells and dewatering pumps offline in the active cover deployment areas, Chiquita saw an increase in on-site odors. This is a complicating factor in Chiquita’s deployment strategy, as continuing to deploy the remainder of the geomembrane cover using this same approach could negatively impact the success of the mitigation measures in place to manage the reaction.

To avoid these potential negative impacts, Chiquita has begun employing a new deployment process that enables the LFG extraction wells and dewatering pumps in active cover deployment areas to be offline for the least amount of time possible, typically one to two days at a time. This new deployment process has been successful thus far, but Chiquita requires more time to fully evaluate the feasibility of the process, to optimize the process to ensure maximum operational efficiency for the remainder of the installation project, and to determine the estimated amount of

² Chiquita additionally disputes DTSC’s characterization of the reaction, including any implication that the reaction area is expanding or that other areas of the Landfill are vulnerable. Chiquita will further address these characterizations in its response to DTSC’s comments on the draft RAW for Protect Cell 8A from Intrusion of Elevated Temperature Landfill Event, to be submitted on November 21, 2025.

³ Despite these difficulties, Chiquita nevertheless provides weekly verbal and written updates to DTSC detailing the progress made to date on the deployment of the geomembrane cover. The weekly verbal updates also inform DTSC of the work to be performed in the coming week to continue deploying the geomembrane cover. Chiquita also submits Monthly Summary Reports to DTSC pursuant to the Order regarding actions taken during the previous calendar month and actions anticipated to be taken during the current calendar month.

Chiquita Canyon, LLC Response to DTSC Request for Updated Cover Deployment Schedule

November 7, 2025

Page 3 of 4

time needed to complete deployment using this new process. Each well, lateral, header, forcemain, electrical line, and panel located in the active cover deployment area, which is constantly changing as the active cover deployment area moves, must be treated uniquely. For example, while some pieces of the system may be relatively straightforward to take offline, others may pose particular challenges due to their apparent location, the area of the Landfill they service, and more. In these more complicated situations, the equipment cannot be disconnected from the system, requiring piping to be lifted so that liner may be placed underneath while maintaining connection to the system. This is extremely tedious and delicate work to ensure that the equipment and infrastructure are not damaged. Even in relatively straightforward situations that allow for equipment to be taken offline, Chiquita must coordinate efforts and schedules with five different groups of people⁴ to disconnect the equipment to move the cover deployment process forward while balancing the competing needs of other onsite projects.

There is not one single cover deployment strategy that will work for the entire project, which requires Chiquita to evaluate on a well-by-well, pump-by-pump, and Segment-by-Segment basis whether the cover deployment process is still feasible without negatively interfering with the mitigation measures in place to manage the reaction. It is of the utmost importance to Chiquita that this new deployment process supports the continued effective management of the reaction by allowing for the continued extraction of heat, gas, and liquids as maximally as possible. Additionally, with a project of this size, unanticipated issues inevitably arise that must be addressed on a case-by-case basis. Any such issues could potentially impact the estimated geomembrane cover deployment schedule.⁵

Chiquita acknowledges that extending the geomembrane cover to more areas of the Landfill is important to DTSC, EPA, and the LEA. However, Chiquita will not compromise on ensuring that the reaction continues to be effectively managed for the sake of accelerating the geomembrane cover deployment rate. An unreasonably aggressive and strict cover deployment schedule would limit Chiquita's ability to continue to evaluate the effectiveness and feasibility of our deployment strategy and to make optimizing adjustments as needed. Above all, such an aggressive and strict schedule could hamper effective reaction management by increasing LFG extraction well and dewatering pump downtime.⁶ These considerations and concerns are why Chiquita used "by November 2026" and "TBD" in the schedule submitted as part of the revised draft RAW—to enable Chiquita to evaluate its deployment strategy on an ongoing basis, determine if improvements are needed to address complications, and adjust accordingly while also continuing to manage the reaction and minimize potential impacts from the deployment.

⁴ These groups of people include, but are not limited to, the internal gas and liquids team, the earthwork contractor, the liner contractor, the gas construction contractor, and the electrical contractor. The order of operations amongst these five groups to disconnect, reconnect, or move the relevant equipment is not always the same.

⁵ Chiquita's October 28, 2025 letter to DTSC illustrates how unanticipated issues can arise and must be addressed before further deployment of the geomembrane cover can continue.

⁶ Chiquita's concerns are not unfounded. During the push to deploy the initial 15 additional acres of the geomembrane cover in Segments 1, 2, and 3 of the Landfill, Chiquita saw an increase in temperatures measured at certain wells and temperature monitoring probes. These temperatures went back down as soon as the LFG extraction wells and dewatering pumps in the active cover deployment areas came back online.

Chiquita Canyon, LLC Response to DTSC Request for Updated Cover Deployment Schedule

November 7, 2025

Page 4 of 4

Chiquita will continue to provide DTSC with weekly updates, both verbal weekly updates on Tuesdays and written weekly updates on Fridays, on the status of the deployment of the geomembrane cover. Chiquita will begin providing DTSC with the bi-weekly updates that Chiquita is currently providing to EPA regarding estimated upcoming project timelines. Chiquita will also contemporaneously evaluate a more detailed geomembrane deployment schedule. Chiquita intends to provide this more detailed schedule on **March 31, 2026**, after the rainy season, with the understanding that this proposed schedule will contain estimated installation dates and require flexibility to address unanticipated issues that may arise with an installation project of this magnitude.

If you have any questions, please do not hesitate to contact me at (346) 807-5547 or Kate.Logan@WasteConnections.com.

Sincerely,

Kate Logan

Kate Logan
Senior Remediation Project Manager
Chiquita Canyon Landfill

cc: Steve Cassulo, Chiquita Canyon
John Perkey, Chiquita Canyon
Dylan Smith, Chiquita Canyon
Thanne Berg, Department of Toxic Substances Control
Peter Ruttan, Department of Toxic Substances Control
Tim Crick, Department of Toxic Substances Control
Christopher Kane, Department of Toxic Substances Control
Johnathon Crook, Department of Toxic Substances Control
Lisa Winebarger, Department of Toxic Substances Control
Bridget Floyd, Department of Toxic Substances Control

ATTACHMENT D



November 21, 2025

Via E-Mail

Diane Barclay, Northern California Division Chief
Site Mitigation and Restoration Program
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826
Diane.Barclay@dtsc.ca.gov

**Re: Chiquita Canyon, LLC Response to DTSC Comments on Draft Removal
Action Workplan: Protect Cell 8A from Intrusion of Elevated Temperature
Landfill Event – DTSC Imminent and Substantial Endangerment
Determination and Order, In the Matter of Chiquita Canyon Landfill,
Docket No. HSA-FY24/25-082**

Dear Ms. Barclay:

Chiquita Canyon, LLC (Chiquita) submits this response to the Department of Toxic Substances Control's (DTSC) October 15, 2025 letter providing comments on Chiquita's draft Removal Action Workplan (RAW) for Protect Cell 8A from Intrusion of Elevated Temperature Landfill Event, submitted on July 1, 2025, pursuant to section 5.3 of DTSC's Imminent and Substantial Endangerment Determination and Order issued to Chiquita on April 2, 2025 (the Order).

The draft RAW detailed Chiquita's intent to protect Cell 8A through its ongoing efforts to facilitate heat removal from the waste mass through both gas and liquids extraction in conjunction with the existing soil barrier. The draft RAW also explained that if the Reaction Committee determined significant worsening of the reaction to the south, past the Condition 9(a) reaction boundary, Chiquita will additionally respond with the actions described in the Soil Reaction Break/Barrier Plan, which could include construction of additional liquid and landfill gas extraction wells, pump installation, and further utilization of thermal oxidation systems for emissions management.

DTSC provided comments on Chiquita's draft RAW more than three months later, on October 15, 2025. DTSC's letter also included comments from CalRecycle dated September 12, 2025. DTSC requested that Chiquita respond to these comments in a letter and indicate whether Chiquita intends to pursue the "alternatives" option described in General Comment #5 on pages 5 to 6 of DTSC's comments.

It is Chiquita's continued position that the requested vertical barrier is unsafe, technically infeasible, and would hinder the efficacy of Chiquita's existing mitigation measures. As such, Chiquita continues to respectfully decline to install the requested vertical barrier and instead explicitly elects to pursue the "alternatives" option.¹ Chiquita is in the process of evaluating viable alternatives that will ensure the continued success of the mitigation measures already in place to manage the reaction while addressing DTSC's request to propose alternatives that protect Cell 8A. The proposed alternatives will additionally include the combination of parameters and data points that trigger implementation as well as the approximate implementation timeline. The alternatives selected will depend on actual Landfill conditions and are subject to change. Chiquita will submit both a Cell 8A Protection Alternative Workplan and a Slope Stability Workplan and an abbreviated version of a revised draft RAW. All submissions will meet the standard of practice for draft engineering plans and reports to be submitted to the State of California, as is Chiquita's practice.

Chiquita's slope stability expert is in the process of further assessing Chiquita's slope stability and will update Chiquita's global slope stability modeling and analysis, including updating its previous west and north slope analyses, and will provide the criteria used for this modeling and analysis and account for seismic stability. Chiquita anticipates providing the Slope Stability Workplan for this analysis to DTSC on December 17, 2025, in light of the upcoming holidays and the substantial work that must be diligently completed for this task.² Chiquita's experts have prepared slope stability analyses for Chiquita on several occasions. Most recently, as DTSC is aware, a Chiquita expert completed a slope stability analysis and assessment for Tank Farm 13 in Cell 8B and found that the tank farm construction achieves acceptable global static factors of safety and is considered statically and seismically stable.³ A Chiquita expert also previously provided static and seismic modeling and analyses for tank farms on November 27, 2024, and concluded that Canyon B, which was being considered for the relocation of Tank Farm 9 at the time, was a statically stable location for the tank farm.⁴ In addition, another expert has previously provided slope stability modeling and analyses for the toe of the Main Canyon slope and other slopes of concern on several occasions,

¹ Chiquita refutes DTSC's statement that Chiquita dismissed the need for the barrier "out of hand." Chiquita spent significant time over the past year evaluating the feasibility and protectiveness of the requested vertical barrier. Chiquita first communicated its concerns with the barrier's infeasibility on November 26, 2024, when Chiquita first submitted the Soil Reaction Break/Barrier Plan to the United States Environmental Protection Agency. Leading up to that submittal, Chiquita, along with its consultants, pursued multiple lines of analysis and troubleshooting to attempt to develop a plan for installation of the requested vertical barrier that was both feasible and safe. Chiquita and its consultants were unable to identify an effective solution. Nevertheless, to be responsive to regulators' requests, Chiquita and its consultants have revisited this issue on multiple occasions for the past year, and the analysis and conclusions on the feasibility and protectiveness of the requested vertical barrier have worsened. Not only does the requested vertical barrier continue to prove infeasible to install for both technical and safety reasons, but its installation would also disrupt Chiquita's existing mitigation measures that have been effectively managing the reaction. This disruption could worsen the reaction conditions, as illustrated by the extension of the geomembrane cover pursuant to the Order and the resulting impacts on temperatures.

² The work involved to complete this slope stability analysis includes, but is not limited to, data collection, data review and consolidation, preparation of graphics, building of model and running of analyses, and preparation and finalization of report.

³ See Professional Engineer Hazardous Waste Tank System Assessment & Certification, prepared by SCS Engineers, Nov. 19, 2025.

⁴ Chiquita Canyon Landfill - Proposed Hazardous Waste Tank System Global Static and Seismic Stability Analysis, prepared by SCS Engineers, Nov. 27, 2025.

including in a report dated February 2024, which concluded “the potential for future instability affecting the underlying landfill containment system is low,” “additional short-term mitigation measures are not warranted,” and “longer-term methods to enhance stability will also not be warranted.”⁵ In another report dated August 2024, Chiquita’s expert concluded, “The results of this evaluation show that the reaction area has no measurable effect on the south-facing, unbuttressed slope of the Landfill that is underlain by Module 4, Module 5, and Cell 8.”⁶ Chiquita also submitted a Slope Stability Analysis Work Plan to US EPA on March 27, 2024, which the agency approved on June 13, 2024.⁷ Lastly, on December 11, 2024, Chiquita’s expert concluded in a technical analysis regarding the Landfill’s stability that “the data shows that the stability of the southern slope of the Landfill and the Cell 8B area are not negatively impacted by the reaction.”⁸ All of these previous slope stability modeling and analyses accounted for seismic stability and collectively concluded that there are no stability issues at the Landfill at this time.

DTSC has also requested that Chiquita submit a draft Master Schedule under the Order. On October 28, 2025, Chiquita requested an extension to November 21, 2025, to submit the draft Master Schedule together with this response. Chiquita provides a draft Master Schedule, which contains relevant activities planned for the Landfill and documents the dates Chiquita provided DTSC with access to data, in **Attachment A**.

Before responding to each of DTSC’s and CalRecycle’s comments herein, Chiquita provides the following discussion addressing several recurring misconceptions and requests that we believe form the basis of the majority of DTSC’s and CalRecycle’s comments.

Elevated Temperature Landfill Events are Long-Term Events with Limited Solutions

There have been several large-scale Elevated Temperature Landfill (ETLF) events in North America documented over the past 20 years. ETLF events refer to certain landfill gas or leachate characteristics that result from prolonged anaerobic bacterial processes and often occur in deep, saturated waste, resulting in increased leachate production, poor landfill gas composition, and increased temperatures.⁹ While each ETLF event is unique, their academic study has led to a better understanding of ETLF event lifecycles that has become widely accepted in the academic, industry, and regulatory communities.

The underlying mechanisms that “initiate” an ETLF event vary, though some ETLFs trace their root cause to the acceptance of specific industrial wastes, such as Coal Combustion Residuals or Aluminum Processing Waste. In these cases, the saturated industrial waste can undergo a chemical

⁵ West and North Slope Stability Analyses, Project No. RM23.1077.00, prepared by Geo-Logic Associates, Feb. 2024.

⁶ Master Development Plan Stability Analyses, Project No. RM22.1077.00, prepared by Geo-Logic Associates, Aug. 23, 2024.

⁷ See Slope Stability Analysis Work Plan, prepared by Geo-Logic Associates, Dec. 14, 2023. The LEA also issued a letter conditionally accepting the Slope Stability Analysis Plan on December 20, 2023.

⁸ Letter to Los Angeles Regional Water Quality Control Board, Chiquita Canyon, LLC – Request for Reconsideration of September 25, 2024 Denial of Authorization to Place Waste in Cell 8B, Dec. 11, 2024.

⁹ See, e.g., M. Krause, et al., Understanding Landfill Gas Behavior at Elevated Temperature Landfills, Waste Management (2023) 165.

reaction, which can produce heat. As an ETLF event unfolds, gas and leachate production typically overwhelm permitted gas and liquids extraction systems. This rapid increase in waste liquid can further hamper gas collection and control systems.

An ETLF event additionally can affect a landfill's typical settlement.¹⁰ Generally, when waste is disposed of, an initial settlement phase occurs due to the weight of waste being placed on top of existing waste and the added weight of heavy machinery, like compactors and bulldozers, that are used to place the waste. Subsequently, there is primary consolidation as ongoing decomposition leads to gas and liquids removal. During an ETLF event, however, the initial settlement and primary consolidation have already occurred. As the reaction progresses, waste material may undergo thermal degradation. Once thermally degraded, these materials may, but do not always, lead to differential settlement.

There is a period of an ETLF event's life cycle in which waste material has undergone some form of cellulosic hydrolysis, resulting in the generation of large quantities of leachate. This accumulated leachate resides in the pore spaces of the waste mass. As previously mentioned, this leads to increased internal pressure inside the waste mass; with perspective of settlement, this leachate helps support the waste mass until it is extracted, at which time final settlement occurs.

Significant infrastructure may be necessary to extract and convey the quantities of gas and liquids. Over time, leachate production declines, but higher temperatures can remain. It is important to distinguish between the existence of temperature and ongoing heat generation, as municipal solid waste landfills are known to have a high heat retention capacity. Reacted material will retain its heat and cool off on a diminishing curve but will not continue to react since there is no raw material left to react. In these instances, and where landfill geometry was permissive, some landfill operators have installed or left an "air break" to separate the ETLF event-impacted area from the rest of the landfill to limit the ability for leachate to migrate into new areas and further saturate industrial waste.¹¹ However, an "air break" is not appropriate at the Landfill due to the relative geometry of the Landfill cells in which the air break would be installed, and because of the existing waste depth and sheer quantity of waste materials that would have to be removed. Considering the magnitude of the required installation, constructing an air break would take several years to accomplish and could result in increased odors and risks for potential fires. This installation would additionally disrupt and impair Chiquita's existing and imperative mitigation measures for managing the reaction.

The Requested Vertical Barrier is Not a Viable Solution for Chiquita

The requested vertical barrier would not be effective for the Landfill due to the characteristics of this reaction and the Landfill's site-specific conditions. A report by Chiquita's consultant, SCS

¹⁰ See, e.g., M. Krause, When Does a Municipal Solid Waste Landfill become an Elevated Temperature Landfill (ETLF)?, U.S. EPA, Washington, DC, EPA/600/R-21/285, 2022, available at <https://www.epa.gov/system/files/documents/2022-04/elevated-temperature-landfills-factsheet-1.pdf>.

¹¹ An "air break" is a void space of "open air" adjacent to a reaction area for purposes of impeding diffusive heat flow from one portion of the waste mass to another. See Soil Reaction Break/Barrier Plan, prepared by SCS Engineers, Nov. 26, 2024.

Engineers (SCS), evaluated potential root causes of the ETLF event and found that Chiquita has never accepted waste streams of the same type identified at other landfills experiencing ETLF events.¹² Additionally, leachate extraction through the normally permitted leachate collection system (LCS) did not vary significantly leading up to the ETLF event, nor did parameters in this waste stream change to suggest an ETLF event. Thus, several important observations can be deduced:

- The usual trigger for an ETLF event did not occur at the Landfill, and the propagation of leachate to other areas of the Landfill was not the sole contributor to the reaction.
- The waste streams that the Landfill was accepting while it was still accepting waste did not trigger the ETLF event.
- There is some inhibition of leachate percolation downward to the liner system and subsequently to the LCS.
- Chiquita's contractors have drilled to depths specified in the data-driven reaction area and found various thick rock layers up to 10 feet thick, varying in elevations from 1,100 to 1,250 feet mean sea level.

While the trigger for Chiquita's ETLF event cannot be attributed to specific waste acceptance, it appears that the growth of the reaction could be attributed to self-sustaining exothermic hydrolysis. Self-sustaining, in this instance, means that the gas and liquids byproducts of the reaction are causing further temperature and heat accumulation.

Thus, it seems likely that the rock layers inside the waste mass hindered gas and liquids extraction, eventually leading to heat accumulation that grew to a point of "tipping" some discrete amount of waste above the pressure and temperature thresholds to create a self-sustaining exothermic hydrolysis reaction. This understanding leads to the following conclusions:

- Chiquita's "canyon fill" type of waste mass is not conducive to an air break or other vertical barrier. The vertical barrier that Dr. Stark proposes has never been attempted, let alone demonstrated effectiveness.
- The installation of the requested vertical barrier must be evaluated for any negative effects it will have on existing mitigation measures being undertaken at the Landfill. As an example, installation of the requested vertical barrier will undoubtedly cause disruption to the ongoing gas and liquids extraction efforts at the Landfill.
- Given that the accumulation of gas and liquids compounds the accumulation of heat and pressure, disruption to Chiquita's gas and liquids extraction efforts is counterproductive and should be avoided.

The Requested Vertical Barrier is Technically Infeasible to Install

DTSC and CalRecycle have not demonstrated how the requested vertical barrier could be installed in such a manner that it would effectively mitigate the reaction. DTSC and CalRecycle claim that

¹² SCS Engineers on behalf of Chiquita, *Elevated Temperature Landfill Causation Investigation Report* (Dec. 8, 2023), at p.9.

the requested vertical barrier would not need to be installed to the depths that Chiquita outlines in the draft RAW to contain the reaction and indicate that shallow borings would be sufficient.¹³ However, because the peak temperatures of the reaction are beneath the liquids level in the waste mass, relatively shallow borings would not prevent the spread of the heat and reaction beneath the borings; deep boreholes and wells would be necessary. Recognizing that the reaction area is within saturated waste and below the liquid level within the waste mass, and therefore deeper boreholes and wells would be required, sonic drilling rigs would be necessary as conventional drill rigs are unable to drill deep into the reaction area without collapsing the borehole. Sonic drill rigs set the casing while drilling to hold the borehole open in order to allow these borings to drill through the liquid. This drilling method would greatly increase the amount of time required to create the requested vertical barrier, as the sonic rigs have a maximum diameter of one foot instead of three feet, requiring a greater number of borings that would need to be up to 250 feet deep. Based on Chiquita's engineers' experiences at other ETLF landfills, each boring could require approximately three days to complete. This dramatically increases the timeline for the installation of the requested vertical barrier by a magnitude of years even if multiple drill rigs were used to complete the project.

Another concern is that landfill drilling routinely results in boring refusal or blockages from past waste burial (steel, concrete, etc.) that prevents a boring from proceeding to full depth. In these instances, a well boring is typically relocated nearby to allow drilling to achieve full depth. However, to accomplish a uniform barrier through boring, no boring locations could be relocated, which is impractical, if not impossible, for drilling inside landfills. Additionally, drilling deep boreholes with a circumference that intrudes upon an existing borehole "shaft" is not feasible because the auger will preferentially migrate into the previous borehole. As a result, these anticipated field application risks significantly limit the feasibility and effectiveness of the requested vertical barrier.¹⁴

The Requested Vertical Barrier is Unsafe to Install

DTSC and CalRecycle have also not addressed the many safety concerns and risks to human health and the environment that Chiquita has raised on several occasions that would result from the installation of the requested vertical barrier.

Considering the magnitude of the installation necessary for the requested vertical barrier, such an effort would likely result in substantial fugitive landfill gas emissions and potential exposure of construction personnel to potentially hazardous conditions associated with landfill gas, leachate, and exposed waste materials. The exposure of buried waste materials to atmospheric conditions, along with operation of an active landfill gas collection system, would increase the likelihood of potential fires, both at the surface of the installation and within the surrounding subsurface. Most importantly, and as explained above, any installation along the horizontal extent of the data-driven reaction boundary would disrupt and impair operations of the landfill collection system and

¹³ See CalRecycle Technical Comment #3 ("The CCL's consultant indicates that the cutoff barrier soil borings would need to be more than 200 ft deep, and this is not feasible. This again is confusing, given that the waste at the interface between Cells 6 and 8 is approximately 80 ft deep and is very achievable.")

¹⁴ For additional discussion on the requested vertical barrier's technical infeasibility, see Soil Reaction Break/Barrier Plan, prepared by SCS Engineers, Nov. 26, 2024.

associated wellfield dewatering system, both of which are imperative to mitigating the ETLF conditions.¹⁵ Installation of such a barrier would also require Chiquita to reduce extraction of landfill gas to avoid oxygen intrusion. Removal of heat through extraction of landfill gas is a crucial mitigation measure and reducing this would be detrimental to the ongoing efforts to contain the reaction. Further, a reduction in vacuum in the area surrounding the barrier would result in increased emissions, with no certainty that such measure would have any appreciable impact on impeding the potential spread of the reaction.

The Reaction is Stable

Chiquita disagrees with DTSC's allegations that "there is an obvious increase in maximum temperatures at various depths" and that "the reaction is growing."¹⁶ From a review of the thirty-day maximum vertical temperature maps submitted to the Local Enforcement Agency (LEA) in the past year, the temperatures captured by the temperature monitoring probes have remained relatively consistent.¹⁷ The Reaction Area Determination reports additionally show that the ETLF conditions remain generally consistent with the initial delineation developed in October 2023.¹⁸ The Reaction Committee has instituted only periodic slight, discrete adjustments to the data-driven reaction area boundary (magenta line) to incorporate select individual landfill gas wells and probes, and there have been no adjustments to the Condition 9(a) Reaction Area boundary (black line).¹⁹

CalRecycle also alleges that the reaction has expanded. CalRecycle cites to two wells, CV-113 and CV-24011, and claims that as of July 2025, they both indicate that the reaction has spread to areas outside of the data-driven boundary.²⁰ The Reaction Committee has since adjusted the data-driven boundary to include CV-24011 in August 2025, finding that a 25-foot adjustment was warranted due to observed poor landfill gas quality, temperature readings, and the short proximity to reaction

¹⁵ For additional discussion on the requested vertical barrier's risks to human health and the environment, see Soil Reaction Break/Barrier Plan, prepared by SCS Engineers, November 26, 2024.

¹⁶ See DTSC's General Comment #3.

¹⁷ See LEA June 6, 2024 Compliance Order; LEA response letter dated May 29, 2024; LEA directive #2(d) dated April 5, 2024; and Weekly Temperature Monitoring Probes Submittals and Reports, May 3, 2024 – June 13, 2024 update, June 21, 2024 – August 1, 2024 update, July 26, 2024 – September 5, 2024 update, August 16 – September 26, 2024 update, August 30 – October 10, 2024 update, September 26 – November 6, 2024 update, October 24 – December 4, 2024 update, November 28 – January 8, 2025 update, December 26 – February 5, 2025 update, February 27 – March 5, 2025 update, March 27 – April 2, 2025 update, May 1 – May 7, 2025 update, May 29 – June 4, 2025 update, July 3 – July 9, 2025 update, July 31 – August 6, 2025 update, August 28 – September 3, 2025 update, October 2, 2025 – October 8, 2025 update, and October 30, 2025 – November 5, 2025 update.

¹⁸ Declaration of Robert Dick, In the Matter of South Coast Air Quality Management District v. Chiquita Canyon, LLC, Case No. 6177-4, submitted before the Hearing Board of the South Coast Air Quality Management District, Oct. 22, 2025.

¹⁹ See Reaction Committee Determinations, prepared by SCS Engineers, October 6, 2023, November 6, 2023, December 6, 2023, January 5, 2024, February 7, 2024, March 7, 2024, April 5, 2024, May 7, 2024, June 7, 2024, July 5, 2024, August 7, 2024, September 6, 2024, October 7, 2024, November 7, 2024, December 10, 2024, January 10, 2025, February 10, 2025, March 10, 2025, April 10, 2025, May 9, 2025, June 10, 2025, July 10, 2025, September 9, 2025 (revised), September 10, 2025, October 10, 2025, and November 10, 2025.

²⁰ See CalRecycle's letter to DTSC, Comments on the Draft Removal Action Plan to Protect Cell 8A from Intrusion of Elevated Temperature Landfill Event, Sep. 12, 2025, at 2.

conditions to the north. CV-113's temperatures have dropped dramatically since October 2025, with its methane levels returning. Temperatures fluctuate on a month-to-month basis, and a well that exhibits higher temperatures one month may exhibit lower temperatures the next. This is precisely why the Reaction Committee considers several different data points and parameters before adjusting the data-driven boundary, and it supports Chiquita's position that the reaction is not a static event. It fluctuates, requiring a trend toward reaction conditions to be confirmed before adjusting the data-driven boundary.

In fact, as explained in the next two paragraphs, the Reaction Committee is seeing signs that the reaction is contracting in certain areas.²¹ During the course of the reaction area determinations, the Reaction Committee also considers whether there are areas of the reaction where the waste mass is cooling. Out of an abundance of caution, the Reaction Committee has not yet removed any of these areas from the Reaction Area, but it has identified the below-described areas where it is seeing improvements in ETLF conditions.

As depicted on the isothermal gradient range maps that are included as Attachment C of the monthly reaction area determination reports, the landfill gas wellhead temperatures recorded each month demonstrate several subareas within the data-driven boundary that consistently exhibit substantially lower temperatures than other wellheads within this boundary. One subarea is positioned in the south-central portion of the data-driven reaction area, and another is positioned in the eastern central portion. Both subareas contain wells exhibiting temperatures below 145°F and many are as low as 130°F. The Reaction Committee continues to review and analyze the data recorded at wells within these subareas to assess whether various operational parameters indicate that the severity of the reaction is diminishing within these subareas, as evidenced by decreasing temperatures, increasing methane-to-carbon dioxide ratios, and decreasing hydrogen content at select wells within these subareas.²²

The Reaction Committee has also identified specific decreases in certain temperature monitoring probes, including those within the reaction area. As reported in the August 2025 determination, TP-8 exhibited decreases in temperature of approximately 10°F over a six-week period at nearly all depth intervals. For example, the temperature at TP-8's 150-foot depth thermocouple decreased from approximately 178°F to 168°F.²³ There were also significant decreases in July 2025 in the maximum temperatures at two temperature monitoring probes located within the current estimated extent of ETLF conditions.²⁴ The maximum temperature of TP-9 declined from 219°F to 209°F during the 4-week period of June 26 through July 24, 2025.²⁵ The maximum temperature of TP-

²¹ See, e.g., Reaction Committee Determination, prepared by SCS Engineers, Aug. 8, 2025, at 4-5 (noting significant decreases in maximum temperatures at specified temperature monitoring probes located within the current estimated extent of ETLF conditions).

²² See Declaration of Robert Dick, *supra* fn. 31 at ¶ 18.

²³ *Id.* at ¶ 19.

²⁴ *Id.*

²⁵ *Id.*

21 declined from 255°F to 214°F during the 12-week period of May 1 through July 24, 2025.²⁶ TP-9 and TP-21 have remained consistent since experiencing the decline in temperature.²⁷

In its latest determination covering the month of October 2025, the Reaction Committee adjusted the data-driven boundary to incorporate one small, distinct area that is immediately adjacent to the boundary in the northeast direction. This adjustment involved an increase in the size of the area within the data-driven boundary of approximately 2.33 percent from the previous month's Reaction Committee determination.²⁸ This adjustment included three landfill gas extraction wells (CV-2333, CV-24126, and CV-25100S/D) and one temperature monitoring probe (TP-18). This minor adjustment is not in the direction of the location of the requested vertical barrier or the Landfill cells, and it was made after careful consideration of multiple data streams. Additionally, Chiquita believes that the recent expansion of the geomembrane cover pursuant to the Order contributed to the minor adjustment of the data-driven boundary line. As part of the deployment of additional geomembrane cover, Chiquita had to take offline all landfill gas extraction wells and dewatering pumps in the active cover deployment areas to complete the cover installation because the cover must be installed underneath the existing piping and infrastructure, requiring removal of portions of the piping to enable installation access. As a result of taking all landfill gas extraction wells and dewatering pumps offline in the active cover deployment areas, Chiquita saw an increase in on-site odors and temperatures. These on-site odors and temperatures went back down as soon as the landfill gas extraction wells and dewatering pumps in the active cover deployment areas came back online.

The overall assessment of the data-driven reaction area should consider both the recent adjustments to the boundary area as well as the areas where we are seeing improvement in temperature and other data. It is not accurate to characterize the reaction as solely expanding; although the Reaction Committee adjusted the data-driven reaction area boundary, there are pockets of cooler areas within the reaction area that are no longer exhibiting definitive evidence of a reaction, as described above. The adjustments more accurately represent the likelihood that heat and reaction gas can move because of aggressive dewatering efforts along the reaction area boundary into areas where the methanogenesis process continues to be the governing mechanism controlling decomposition. There are different grades of severity for impeding and disrupting methanogenesis, which can more accurately be thought of as occurring on a spectrum rather than as a binary event.

The reaction is stable. Although DTSC is not party to the Stipulated Order, the Reaction Committee analyzes a plethora of data streams to come to its conclusions on a monthly basis. The efficacy and accuracy of this exercise should not be discounted just because DTSC does not want to believe the

²⁶ *Id.*

²⁷ *Id.*

²⁸ Since January 2025, the size of the data-driven boundary has only changed on three occasions: May 2025 (approximately 6.9 percent increase); August 2025 (approximately 0.44 percent increase); and October 2025. The reaction area size did not change in February, March, April, June, July, or September 2025. The increases seen in May, August, and October 2025 are all minor changes that do not take into consideration the potential contractions of the reaction area.

Reaction Committee's conclusions.²⁹ If the agency is concerned with the reliability of the Reaction Committee Determinations, Chiquita notes that South Coast AQMD, as the agency who ordered these reports and reviews them every month, has not raised issue with the validity of these reports' conclusions. Additionally, all of the data that the Reaction Committee utilizes to form the bases of its analyses and conclusions are wholly available within the report itself. DTSC's requests for raw data or a "deeper data set" do not get DTSC access to any more data than what is already reported in the Reaction Committee Determinations, which is data that DTSC already had access to by virtue of reviewing each month's report. The fact that DTSC is not party to the Stipulated Order does not diminish the reliable and objective third-party review conducted by the Reaction Committee and South Coast AQMD each month pursuant to the Stipulated Order.

Temperature Alone is not Indicative of Reaction Conditions

As DTSC acknowledges in its comments, temperature alone is not dispositive of reaction conditions.³⁰ Rather, a multitude of parameters and data points are constantly monitored to determine whether, in the aggregate, the reaction is expanding. This includes parameters and data points that evaluate gas composition, like methane to carbon dioxide ratio, hydrogen, methane, and carbon monoxide. Additional factors like accelerated settlement, strain value, excess leachate quantities, pressurized liquids releases, odors, observations of subsurface waste conditions and characteristics, and more must also be considered in conjunction with temperature and gas composition data. Therefore, many of DTSC's comments and the Order, which conclude that the reaction is expanding based solely on temperature, are factually incorrect.

Chiquita's Ongoing Mitigation Measures are Highly Effective and Must Not be Impaired

In consultation with and under the close supervision of its many regulators, Chiquita is implementing numerous, unprecedented measures to minimize the spread of the reaction and address any potential impacts from the reaction. These mitigation measures have proven to be highly effective and are imperative to the management of the reaction. Any alternative(s) explored or implemented must not impede the effectiveness of Chiquita's existing mitigation measures.

Landfill Gas Collection and Control System

Chiquita's landfill gas collection and control system is designed to minimize fugitive emissions of landfill gas. Horizontal landfill gas collection trenches and vertical landfill gas extraction wells are connected to a central header (pipe) system that conveys landfill gas to the flares, where odorous compounds are converted to harmless byproducts, carbon dioxide, and water vapor. Chiquita installed three thermal oxidizers (TOx) at the Landfill to assist the three existing flares with fully combusting the landfill gas from the reaction area. The TOx allows Chiquita to increase its control

²⁹ In fact, DTSC should be pleased with the most recent Reaction Committee Determination, in which the Reaction Committee adjusted the data-driven boundary. The Reaction Committee does not engage in this monthly analysis just to go through the motions of complying with the SOFA. It engages in a rigorous analysis subject to unanimous approval and agreement before any conclusions are drawn.

³⁰ See DTSC's General Comment #4 ("It is true that the sole use of temperature as a measurement for the boundary of the reaction may produce bias. . . .")

capacity (i.e., its ability to burn landfill gas to combust constituents, reducing their emission to the atmosphere) on a faster timeline than the timeline for permitting and constructing a new flare. The TOx is also better able than the flares to convert the constituents in the reaction gas to carbon dioxide and water vapor.

Extraction of landfill gas is an important aspect of helping to control the off-site migration of the landfill gas and the subsequent potential for odors reaching a community, and to reduce the spread and heat generation associated with the reaction. Chiquita has expanded its landfill gas collection and control system to address the reaction gas. Since December 6, 2023, in addition to operating a new landfill gas flare and two new TOx, Chiquita has installed over 315 new vertical landfill gas extraction wells. Since December 1, 2023, Chiquita has also installed approximately 67.5 miles of pipe throughout the Landfill. This work is ongoing, and additional wells, pipes, and other control devices (e.g., flares) are being designed and planned for installation in 2026.

Extracting landfill leachate is another key measure for reducing the spread and impact of landfill reactions and removing perched leachate from the landfill. Chiquita is installing dewatering pumps in its vertical landfill gas extraction wells to pump perched leachate out of the Landfill. As of November 14, 2025, Chiquita has installed and began operating pumps in over 146 wells, and this number continues to increase. As a result of the installation of the additional piping, vertical landfill gas extraction wells, and dewatering pumps, Chiquita has been able to extract approximately 137 million gallons of liquids from January 1 through November 9, 2025.³¹ The continued and aggressive extraction of liquids from landfills experiencing ETLF events is critical in their management and containment.

Geosynthetic Cover

The existing geosynthetic cover is a 30-mil (0.030 inches) HDPE (i.e., plastic) liner installed over the west and north slopes and the top deck of the reaction area. Surface landfill gas collectors (perforated pipes that lay flat on the ground) have been installed under the cover to allow for gas collection between the surface of the landfill and the geosynthetic cover. Soil was placed in certain areas on top of the geosynthetic cover to protect it and allow for vehicles to access the area. A series of storm drains and lined ditches control surface drainage from the cover and direct stormwater to existing control structures.

On July 21, 2025, Chiquita began the process of installing additional geomembrane cover pursuant to the Order. As required by the Order, the cover is made of HDPE and has an inner core made of ethylene vinyl alcohol (EVOH) barrier resin. This EVOH/HDPE geomembrane cover is 60-mil (0.060 inches) thick, meaning that it is more resistant to general wear and tear, and it is tan in color and textured on both sides. The new geomembrane deployment areas will be contiguous and tied into the pre-existing 30-mil HDPE geomembrane cover. Chiquita has also installed landfill gas

³¹ Stipulated Order for Abatement, Case No. 6177-4, Condition 53 Weekly Report, Nov. 12, 2025 (accessible at https://s3.us-west-1.amazonaws.com/chiquitacanyon.com.bucket/2025/11/2025-11-12-Case-No_-6177-4-Stipulated-Order-for-Abatement-%E2%80%93-Condition-53-Weekly-Report-1.pdf).

collectors beneath the EVOH/HDPE geomembrane cover. As of November 14, 2025, Chiquita has installed approximately 16 additional acres of this EVOH-HDPE geomembrane cover.

Chiquita expects this additional geomembrane cover will increase the effectiveness of the landfill gas collection system and thus further help control potential odors by limiting surface emissions from the Landfill.

The West Toe Drain Installation

This project facilitates leachate drainage and additional leachate collection along the west slope of the Landfill, improves gas collection by completing the installation of the geosynthetic cover, and allows for stormwater collected on top of the liner to flow directly into the concrete stormwater channel.

To do so, a new toe drain and secondary drain were installed, and the temporary plastic cover was replaced with geosynthetic cover. A toe drain is a system that collects and routes water or leachate from a landfill's slope to a designated location for removal. To install the permanent toe drain and liner, Chiquita excavated across an area measuring approximately 55,000 square feet (representing a volume of approximately 14,000 cubic yards of soil and buried waste). This project ensures the continued success of Chiquita's aggressive liquids extraction efforts by enabling the convenient collection of liquids for removal.

Waste Temperature Monitoring Probes

A critical measurement used by Chiquita and its consultants in assessing the reaction is the temperature of waste in and around the reaction area. Chiquita installed waste temperature monitoring probes (referred to as TMPs, TPs, or probes) in and around the reaction area to monitor waste temperatures at varying depths within the Landfill's waste mass. As of November 14, 2025, Chiquita has installed 39 probes to continuously monitor these temperatures. The additional probes enable Chiquita to vigilantly monitor for changes in temperature that, in conjunction with other observed changes, could indicate an expansion of the reaction.

Recent Additions

Chiquita has added several other mitigation measures to its reaction management strategy, including three new groundwater monitoring wells (two onsite and one offsite), a perimeter odor control misting system to reduce potential odors in nearby communities, and ten micro gas chromatograph air monitoring units, including at six of seven of the previously installed air monitoring stations in nearby communities, which monitor for air constituents 24 hours a day, seven days a week.

In sum, the combination of these best management practices to manage the reaction has allowed Chiquita to effectively and aggressively monitor and manage the reaction and prevent its expansion. In fact, as stated in the draft RAW, the reaction has stabilized and reached an

equilibrium. Disturbing Chiquita's existing mitigation measures would risk exacerbating the reaction.³²

Data Access and Verification

The data that the Reaction Committee uses to evaluate the reaction on a monthly basis can be found entirely within each Reaction Area Determination. Therefore, DTSC already had all of the data it needed to verify the Reaction Committee's findings. Nevertheless, Chiquita arranged for SCS to grant DTSC access to SCS eTools and RMC so that DTSC can view the same raw data that the Reaction Committee uses to issue its monthly findings. Again, the data that the Reaction Committee uses to support its findings are all reported in each Reaction Area Determination, so DTSC's recent access to Chiquita's raw data does not change DTSC's ability to verify the Reaction Committee's findings.

Chiquita's arrangement for DTSC's access to Chiquita's raw data via SCS eTools and RMC is unprecedented. To Chiquita's knowledge, direct agency access to raw data of this magnitude from parties who are not the regulated entity has never been arranged, nor was such arrangement easy. SCS eTools and RMC are internal control data tools for professionals with extensive knowledge and expertise of landfills and landfill gas systems. They provide experienced operators and landfill professionals with the ability to quickly view, upload, and analyze data. To provide DTSC access to these tools required modification of both SCS eTools and RMC to allow the agency read-only access to prevent the inadvertent modification of data, deletion of files, or other changes that could affect the Landfill's operations and compliance.

Direct agency access to Chiquita's raw data provides DTSC with a unique amount of oversight over the Landfill. It is Chiquita's hope that by granting DTSC such direct access, DTSC will be able to accept, verify, and replicate Chiquita's analysis and conclusions concerning the reaction, and that Chiquita and DTSC can move forward with a mutual understanding of the best management practices to effectively manage the reaction.³³

Chiquita responds to each of DTSC's and CalRecycle's comments below.

³² For example, Chiquita's initial efforts to deploy the Order's required geomembrane cover required Chiquita to take all landfill gas extraction wells and dewatering pumps in the active cover deployment areas offline to complete the installation because the cover must be installed underneath the existing piping and infrastructure, requiring removal of portions of the piping to enable installation access. (Chiquita Canyon, LLC Response to DTSC Request for Updated Geomembrane Cover Deployment Schedule – DTSC Imminent and Substantial Endangerment Determination and Order, In the Matter of Chiquita Canyon Landfill, Docket No. HSA-FY24/25-082, Nov. 7, 2025.) As a result of taking all landfill gas extraction wells and dewatering pumps offline in the active cover deployment areas, Chiquita saw an increase in on-site odors. This was a complicating factor in Chiquita's deployment strategy that forced Chiquita to pivot, as continuing to deploy the remainder of the geomembrane cover using this same approach could negatively impact the success of the mitigation measures in place to manage the reaction.

³³ Chiquita notes that the "deeper data set" referenced in the draft RAW is entirely available within each Reaction Committee determination that is submitted to the South Coast AQMD on a monthly basis and published on Chiquita's website. DTSC already had access to this data set prior to gaining access to SCS eTools and RMC.

DTSC's General Comments

Chiquita responds to DTSC's general comments at the outset of this letter.

DTSC's Specific Comments

1. Section 1.0 Introduction, Paragraph 3: This section discusses the Reaction Committee and SCAQMD. DTSC disagrees with the lack of "consistent directional expansion" since temperature monitoring probes TP-29, TP-20, and TP-31 are well outside of the current reaction boundary towards the edge of the top deck, and all have maximum temperatures exceeding 170° Fahrenheit.

Temperature monitoring probes outside of the reaction area with maximum temperatures exceeding 170° Fahrenheit do not indicate an expansion of the reaction. As DTSC acknowledges in its comments, temperature alone is not dispositive of reaction conditions.³⁴ For example, in the most recent Reaction Committee determination dated November 10, 2025, regarding October 2025 data, the Reaction Committee evaluated the 30-day maximum temperatures recorded in several temperature monitoring probes, including TP-29 and TP-31, finding that the temperatures had remained relatively consistent over the previous 6-week period of September 25 through November 5, 2025, except for several one-day increases and subsequent decreases at the 240-foot interval in TP-29.³⁵ The maximum temperature at the 240-foot thermocouple of 193° Fahrenheit occurred for only a single day, and the average temperature during the 30-day period was only 184° Fahrenheit. The Reaction Committee nevertheless concluded that an adjustment to the boundary of the Condition 9(a) Reaction Area was not warranted because the two wells surrounding TP-29 recorded average landfill gas wellhead temperatures during August through October of 130° Fahrenheit and average methane concentrations of 46 percent during this period. This suggested normal subsurface decomposition conditions affiliated with methane production. The reaction thus lacks "consistent directional expansion," as the Landfill is not seeing reaction conditions (which include more than temperature indicators) consistently in one direction.

Additionally, a review of the thirty-day maximum vertical temperature maps provided to the LEA each month for the past year indicates that TP-20 has consistently measured below 141° Fahrenheit. It is unclear why DTSC believes that TP-20 has experienced maximum temperatures exceeding 170° Fahrenheit.

³⁴ See DTSC's General Comment #4 ("It is true that the sole use of temperature as a measurement for the boundary of the reaction may produce bias. . . .")

³⁵ See Monthly Reaction Committee Determination on Reaction Area Boundary Chiquita Canyon Landfill – Castaic, California, prepared by SCS Engineers, Nov. 10, 2025.

2. Section 1.0 Introduction, Paragraph 4: This section states a conclusion of Dr. Craig Benson from a declaration that was given on July 17, 2025. DTSC requires the declaration to be attached to the revised RAW for the declaration to be considered in any RAW analysis.

Chiquita provides the declaration of Dr. Craig Benson in **Attachment B** to this response and will append it to the revised draft RAW. Chiquita clarifies that the declaration was filed on June 12, 2025, not July 17, 2025.

3. Section 1.0 Introduction, Paragraph 5: This section states that a “soil barrier” was constructed between Cell 6 and Cell 8A and cites details of the soil barrier are presented in the CQA Report prepared by SCS Engineers and submitted to DTSC on May 13, 2025.

For the reasons stated above, and in our May 19, 2025, response letter, DTSC rejected the soil barrier in that CQA Report because the soil barrier is not an adequate measure preventing the expanding reaction from entering Cell 8A and jeopardizing slope stability. Also, DTSC questions the accuracy and quality of information presented in the drawings (particularly Drawings 2 and 3) presented in the CQA Report. For example, Figure 2 of the CQA Report itself (Site Layout) shows the plan view of “soil barrier area” as situated within Modules 2B/3, 4 and 5, and Canyon D, well away for the plan view of the border between Cell 6 and Cell 8A. Additionally, the cross section (Figure 3, “Details”) is minimally informative, has no associated cross-section project lines on Figure 2, which is standard practice, and provides no reliable details regarding subsurface conditions (i.e., limits/locations of the modules/cells in the subsurface at a minimum). If the Respondents are to rely on the CQA Report as an alternative justifying protection of Cell 8A, the CQA Report must be revised to include informative/accurate drawings. Incorporation of the CQA Report wall into any RAW barrier will necessitate testing to field verify the location, extent, and composition of the existing soil barrier.

Chiquita intends to rely on the CQA Report as an alternative, in conjunction with the Landfill’s existing mitigation measures, justifying protection of Cell 8A. Chiquita’s consultant, SCS, is in the process of revising the CQA report to address DTSC’s comments and to include DTSC’s requested information. SCS anticipates finalizing the CQA report on January 9, 2025, in consideration of the upcoming holidays.

However, Chiquita disputes DTSC’s characterization of the CQA report submitted on May 13, 2025. The CQA report is accurate. The information provided therein accurately describes what was constructed. Definitionally, the CQA report is only meant to summarize the construction activities engaged to install the existing soil barrier. Whether the existing soil barrier provided an adequate measure in preventing the spread of the reaction is immaterial to the CQA report’s accuracy. While SCS can revise the CQA report to address DTSC’s comments and include DTSC’s requested information, such revisions will not change what was constructed and where. As such, the CQA report is accurate and to a standard quality to summarize the type of construction conducted.

DTSC’s rejection of the CQA report hinges on the misconception that the existing soil barrier is inadequate because it does not insulate entirely against heat from the reaction side of the soil from spreading to the non-reaction side of the soil. The existing soil barrier does not need to do this.

The ETLF event at the Landfill is not a result of reactive waste, as discussed above. This means that heat generation is not readily quantifiable, and the amount of heat that any barrier would need to insulate against is not calculable. Additionally, Chiquita's existing soil barrier is not meant to be a 1-to-1 substitution for the requested vertical barrier. Chiquita's existing soil barrier is just one of many mitigation measures working together as part of a larger reaction management strategy that, when evaluated together, proves to be an effective reaction containment strategy.

4. Section 1.0 Introduction, Paragraph 6: This section states that the removal of heat through gas and liquid extraction have "...successfully stabilized the reaction." DTSC disagrees with the statement based on review of limited data available to the department and notes that this paragraph appears to contradict Dr. Benson's assessment.

Chiquita reiterates its prior statements that its mitigation measures have successfully stabilized the reaction. DTSC has access to the Reaction Committee's monthly determinations, which contain copious amounts of data to support the conclusions therein. It is unclear why DTSC disagrees with the statement that the removal of heat through gas and liquid extraction have "successfully stabilized the reaction." DTSC does not provide any analysis or evidence for its conclusion as part of its comments, so it is difficult for Chiquita to assess the veracity of DTSC's conclusion. Regardless, DTSC now has access to Chiquita's raw data and will be able to accept, verify, and replicate Chiquita's analysis and conclusions concerning the reaction, and Chiquita is available to address any follow-up questions that may arise.

It is additionally unclear which of Dr. Benson's assessments DTSC believes is contradicted by Chiquita's assertions. Dr. Benson's declaration repeatedly supports Chiquita's statement that the removal of heat through gas and liquid extraction have "successfully stabilized the reaction." (See, e.g., Declaration of Craig H. Benson, ¶ 31 ["Data collected from the temperature monitoring probes ("TMPs") also indicate that the best management practices are maintaining stable conditions within the landfill"]; ¶ 36 ["My own review of the thermal data that has been collected to date, albeit over the relatively short period in which I have been engaged in this assessment, suggests that the subsurface temperatures that are elevated are stable"]; ¶ 39 ["The facts show that subsurface temperatures have remained relatively stable, airborne emissions have diminished, and complaints have dropped considerably in response to implementation of best management practices at Chiquita Canyon Landfill. These facts suggest that the best management practices have been effective, the ETLF is stable, and impacts on the surrounding community have been reduced. The logical inference from these facts is that the best management practices should continue to be implemented unless new information to the contrary becomes available"]; ¶ 41 ["The data suggest that the thermal conditions are stable, and that emissions at Chiquita Canyon Landfill are being managed effectively. The best management practices that are being applied are effective"].)

5. Section 1.0 Introduction, Paragraph 7, Bullet points: DTSC provides the following comments regarding the four bullet points presented.
 - Weight of Evidence. DTSC appreciates the work of the Reaction Committee, but the department is not bound by the conclusions of the SOFA.

- Existing Soil Barrier. The location and efficacy of this barrier to prevent migration of the reaction has not been adequately demonstrated to DTSC, and therefore DTSC cannot accept that it acts as a barrier between Cell 6 and Cell 8A.
- Ongoing Monitoring. The temperature monitoring probe exhibits show continued increasing temperatures toward the east and south. Additionally, the lack of comprehensive data sharing makes it impossible for DTSC to verify the statements by CEC.
- Southern Expansion. DTSC and CalRecycle believe the reaction is expanding. The rate of expansion is impossible to discern without full data, but planning for mitigation must occur now.

As explained at the outset of this letter, temperature is not a dispositive indicator that the reaction is expanding. Chiquita will provide an updated explanation in the revised draft RAW detailing the existing soil barrier's efficacy as a mitigation measure, in addition to several other mitigation measures continuing to be implemented. Chiquita expects that the comprehensive data shared with DTSC will support its current practices and its previous statements.

6. Section 1.0 Introduction, Paragraph 8: This section states that "...the current heat removal program, in addition to the soil barrier already placed, appears to be effectively **containing** the reaction" (emphasis on "containing" added by DTSC). It is not clear if the in-place soil barrier referenced in this section is the same one referenced in the CQA Report that is located between Cell 6 and Cell 8A or Cell 4 and 5. Also, note that Figure 1 in Appendix D.2 shows the current reaction area line is located at least 150 feet from the Reaction Area Boundary – Condition 9A at its closest location, and at least 850 feet from the approximate Reaction Area Boundary Based on Data Review at its closest. Similarly, Cell 8A is located about 700 feet from the Reaction Area Boundary – Condition 9A at its closest location and about 1300 feet from the approximate Reaction Area Boundary Based on Data Review at its closest.

To be considered a viable option, the revised RAW text must include an explanation of how the in-place soil barrier is currently containing the reaction given that (1) its location shown in Figure 1 is not adjacent to the current reaction area, (2) it has not been demonstrated that five-feet of soil (that was not tested or selected for thermal shielding) is sufficient for containing the reaction, and (3) there appears to be at least 200 feet of waste between the bottom of the barrier and the liner.

The existing soil barrier referenced in this section is the same one referenced in the CQA report. Chiquita will provide an updated explanation in the revised draft RAW detailing the existing soil barrier's efficacy as a mitigation measure, in combination with Chiquita's other mitigation measures, including the rationale for its chosen location, the benefits provided by the five feet of soil, and clarification of the depth of waste between the bottom of the barrier and the liner and how this relates to the existing soil barrier.

7. Section 2.3.1 ETLF (Elevated Temperature Landfill) Response: This section lists many of the actions that have been taken by CCL under various orders from government regulators, including DTSC's ISE Order. It must be noted that CCL did not follow DTSC's explicitly written ISE Order for tank farm relocation (Task 8), which stated "...the tanks, or any other structures, may not be placed upon the covered area upon completion of said cover or any area that may be subject to the SET event in the future." New Tank Farm 13 is located in Cell 8B and most of New Tank Farm 13 is placed on top of 60-80 feet of waste, that is subject to expansion of the SET event. This move of the tank farm was not done in "...collaboration and under the close supervision..." of DTSC; the tank farm was being moved before the Task 8 RAW was submitted to DTSC.

This section touches on the soil barrier plan by SCS Engineers that was submitted to DTSC in May 2025 as the CQA Report as well as the West Toe Drain Project. To begin with, the soil barrier shown in the CQA Report is not between Cell 8A and Cell 6, but rather, located over Modules 4 and 5 (as shown in the SCS exhibit in the CQA Report itself). The West Toe Drain project, as noted earlier in this comment letter, is one of the reasons why DTSC is so concerned about global slope stability at CCL. An uncontrolled SET event will lead to slope instability due to a lack of soil cohesion and pore friction in the waste prism caused by leachate generation. Unlike the West Slope, the main canyon does not have a toe-of-slope natural existing barrier to stop failure.

The monitoring data showing the leachate liquid levels along the western slope indicating a decrease in leachate production is also discussed in this section. DTSC is encouraged by this decrease and believes that this sort of collaboration of planning can also be reflected in the vertical barrier issue.

As DTSC is aware, Chiquita's position since January 2025 to relocate Tank Farm 9 has been that Cell 8B is the only feasible option.³⁶ DTSC and other agencies requested Chiquita consider Wolcott Way; however, that location was determined infeasible for several reasons. First, Wolcott Way is the closest location to the public. With the ongoing concerns of odor mitigation, Wolcott Way would have brought the tank farm within less than a mile³⁷ of the public, directly adjacent to SR-126. It would have also been the most visible to the public. During community meetings, members of the public stated that they did not want the tank farm relocated to Wolcott Way due to the visual impacts that would result. Additionally, the County has continued to assert that Chiquita is obligated by its Conditional Use Permit (CUP) to turn Wolcott Way into a new entranceway, which would not additionally accommodate a tank farm. Moreover, Wolcott Way is located outside of the Landfill's footprint, implicating several additional permits that Chiquita would have been required to obtain prior to commencing the relocation of Tank Farm 9. Given the urgency required by the Order for Tank Farm 9's relocation, waiting for additional permits to be issued would have put an indefinite pause on the relocation efforts.

³⁶ See, e.g., email from John Perkey to Linda Lye and Teresa Quiaioit, copying several agencies including DTSC, RE: CCL - Tank Farm Update, Jan. 31, 2025.

³⁷ Note there is a planned housing development just outside Wolcott Way that would have been located approximately 972 feet from the tank farm had it been relocated to this location.

Additionally, relocating Tank Farm 9 to Wolcott Way would have prevented the tanks from being gravity fed, which would have required the leachate to have been pumped under pressure over significant distance and elevation. This pumping would have required electricity to operate. The tank farm would have also been disconnected from the Main Canyon Landfill, and the closest to the Santa Clara River. Lastly, Wolcott Way is not as protective as Cell 8B from wildfires due to its location outside of the ridgeline of the Landfill. With the increase of wildfire incidents in 2025, this alone was a significant factor in why Chiquita determined Wolcott Way to be infeasible for the relocation of Tank Farm 9.

Cell 8B is the best—and only—feasible option. Cell 8B is the least visible and furthest away from the public. The addition of soil in further preparation for the relocation of the tank farm to Cell 8B further stabilized the Landfill. Cell 8B is also located within the Landfill’s footprint, reducing permitting and approvals necessary to proceed with the relocation, and thus minimizing delay. By being within the Landfill’s footprint, Cell 8B also provides tertiary containment and is most protective from wildfires. Cell 8B additionally allows the tank farm to be gravity fed, meaning that minimal pumping under pressure is required to move the leachate.

Chiquita disagrees with DTSC’s mischaracterization that “most” of the new tank farm, Tank Farm 13, is placed on top of 60 to 80 feet of waste “that is subject to expansion of the SET event.” First, only a small portion of the tank farm is built over waste from Cell 8A. Chiquita provides a figure in **Attachment C** depicting the small portion of Cell 8A on which Tank Farm 13 encroaches. Moreover, there is substantial soil fill on top of that waste. The approximate waste depth in this area is 70 to 90 feet, which minimizes the potential for future settlement. Slope stability analyses conducted also concluded that the relocation of Tank Farm 9 to Cell 8B would not impact slope stability in the area.³⁸

All of this was communicated to DTSC on several occasions, including during a January 28, 2025 meeting and in a written follow-up communication on January 31, 2025, when Chiquita shared with all of its regulators, including DTSC, its detailed analysis of the different locations for the relocation of Tank Farm 9 being considered.³⁹ Although Chiquita began the work in preparation for moving the tank farm before the Task 8 RAW was submitted to DTSC, DTSC was aware of Chiquita’s activities prior to this submittal.⁴⁰ Yet DTSC never told Chiquita that it must wait to proceed and did not provide substantive feedback despite many opportunities to do so during Chiquita’s and DTSC’s weekly technical meetings. In fact, DTSC requested regular updates on Tank Farm 9’s relocation and provided input on the relocation process. DTSC never directed Chiquita to cease relocation or place the tank farm at a different location despite having numerous opportunities to do so. The first time DTSC provided any sort of substantive feedback on Tank

³⁸ See supra fn. 3.

³⁹ See supra fn. 8.

⁴⁰ In addition to prior communications, DTSC and Chiquita technical personnel met weekly beginning on April 8, 2025, to discuss implementation of the Order and development of the three RAWs, including the Task 8 RAW and the intended location for the new tank farm. DTSC was also aware that Chiquita planned to relocate the tank farm because DTSC instructed Chiquita to do so in its Summary of Violations (SOV) issued to Chiquita on April 1, 2025. DTSC’s SOV threatened daily penalties if Chiquita did not come into compliance and relocate the tank farm.

Farm 9's relocation was many months later on July 29, 2025,⁴¹ and the feedback provided had never been previously mentioned. Although the RAW was not formally approved before beginning relocation, concerns with human health and the environment and technical feasibility took precedent in Chiquita's decision to proceed. Further, DTSC's Summary of Violations required movement of Tank Farm 9 and assessed daily penalties until completed.

As discussed above, the CQA report for the existing soil barrier is accurate. The existing soil barrier was constructed with the waste fill from construction of Cell 8A and Cell 6. Its location is accurately depicted. Additionally, Chiquita's past slope stability analyses do not indicate global slope stability concerns at the Landfill, as explained earlier. Nevertheless, Chiquita's slope stability expert is in the process of conducting further analysis to evaluate global slope stability at the Landfill and impacts that could result if the reaction were to expand.

Chiquita disagrees with DTSC's characterization of the West Toe Drain project. The principal purpose of the West Toe Drain project was to improve leachate removal in this portion of the site. As DTSC knows (or should know), lowering leachate levels increases the effective stress in the waste mass and therefore improves, rather than reduces, slope stability. Given this, it is difficult to understand why the West Toe Drain project is being cited as a source of concern regarding global stability.

The statement that "an uncontrolled SET event will lead to slope instability due to a lack of soil cohesion and pore friction in the waste prism caused by leachate generation" is overly generalized and does not reflect the mechanics of waste-slope stability. Increased leachate generation and potential reductions in MSW shear strength can occur following a SET event, but whether those factors contribute meaningfully to a stability issue depends on multiple site-specific variables such as slope geometry, drainage conditions, waste composition, and engineered controls. Suggesting an automatic causal relationship oversimplifies what is a complex, multi-parameter analysis.

In this case, the southern slope of the main canyon has a substantially different geometry than the western slope, and the two areas are not directly comparable. Moreover, this area of the main canyon is underlain by a continuous leachate collection and removal layer across the entire base liner system, which is specifically designed to limit elevated leachate heads and the associated stability impacts.

Chiquita is happy to continue discussing the actual controlling factors for stability at this site, but the analysis needs to reflect current engineered conditions and established geotechnical principles.

Chiquita is pleased that DTSC finds the decrease in the leachate liquid levels along the western slope encouraging. It is unclear to Chiquita, however, how the monitoring data results represent a "collaboration of planning" let alone that which could be reflected in the vertical barrier issue. Chiquita would appreciate additional clarification regarding this statement. For example, Chiquita would be amenable to collaborate with DTSC to determine different metrics, like triggers based

⁴¹ The first time Chiquita heard substantive feedback from DTSC regarding the relocation of the tank farm was this date, on which DTSC provided Chiquita with its comments on the draft tank farm RAW that Chiquita submitted on May 9, 2025.

on leachate levels, indicating continued improvement in the management of the reaction such that the alternatives to be explored pursuant to the Order would no longer be necessary.

8. Section 2.3.2 Reaction Area Determination: DTSC would like to verify and replicate the Reaction Committee's findings, and to do so, needs unfiltered, uncured, and unedited access to all data, preferably through SCS eTools. DTSC also notes that the Reaction Committee believes the SET event has increased but has not exceeded the Reaction Area Boundary created by the SOFA. DTSC and CalRecycle concur that the reaction is expanding. The RAW goes on to state, "Given that the analysis in the ISE Order is based on temperature only, it lacks the deeper data set used by the Reaction Committee, in accordance with the SOFA, and is consequently a less complete assessment of the Site condition." DTSC would like the opportunity to verify and replicate the Reaction Committee's findings; however, without access to all of the data, DTSC is unable to accurately verify and replicate the Reaction Committee's findings. Thus, in the absence of data to demonstrate otherwise, it continues to be the position of DTSC and CalRecycle (and the Reaction Committee) that the reaction is expanding. There may be a difference of opinion on the speed of the reaction's growth, but the RAW and the Reaction Committee determination on June 10, 2025, both state the reaction has grown. Furthermore, even if the reaction is believed to be at or near equilibrium, planning contingencies to protect Cell 8A must be addressed now in case the SET event threatens slope stability.

As stated above, Chiquita is providing unprecedented access to Chiquita's raw data via SCS eTools and RMC. Chiquita continues to disagree with DTSC's and CalRecycle's assertions that the reaction is expanding. Additionally, DTSC's characterization of statements made in the draft RAW and the Reaction Committee's determination from June 10, 2025 is incorrect. Neither the draft RAW nor that determination state that the reaction has grown. Rather, the adjustments made to the data-driven boundary line were limited and reflect typical, minor fluctuations in subsurface conditions observed at the edge of the Reaction Area at the time, and support Chiquita's conclusion that the reaction is stable. Further, there is no evidence that the reaction will threaten slope stability. These issues are all addressed at the outset of this letter.

9. Section 2.4 Requested Vertical Barrier Feasibility, Paragraph 2: In this section, the Respondents claim that they want to protect Cell 8A. DTSC and the Respondents are aligned in their desire to protect the entrance to the landfill. If the vertical barrier is deemed not feasible by the Respondents, an alternate proposal to stop the reaction must be proposed. The status quo of gas and leachate removal has not been adequately demonstrated to be stopping the growth of the reaction. As cited above, DTSC requires the Respondents to propose a minimum of three alternatives that will protect against catastrophic slope failure – especially near the entrance to the landfill.

As explained at the outset of this letter, and in several other submittals to Chiquita's regulators, the requested vertical barrier is not feasible. Chiquita's substantial and ongoing mitigation measures are effectively managing the reaction. Nevertheless, Chiquita will consider and propose additional alternatives to the requested vertical barrier.

10. Section 2.4 Requested Vertical Barrier Feasibility, Paragraph 3: DTSC understands that there will be issues with odor control and leachate management. However, the SET event

must be controlled, and the status quo has not adequately demonstrated that Respondent is achieving this goal.

As DTSC acknowledges, installation of the requested vertical barrier, if it was even feasible, would result in emissions and leachate management issues. As the regulated entity, Chiquita will bear the weight of heightened enforcement from its regulators for such emissions and leachate management issues resulting from the installation of the requested barrier. It is unreasonable for DTSC to order Chiquita to install the requested vertical barrier when it knows that doing so will open Chiquita up to further enforcement actions and regulatory compliance issues.

Contrary to DTSC's belief, and as explained at the outset of this letter and in Chiquita's numerous other submittals to the regulators, Chiquita's current mitigation measures are effectively managing the reaction.

11. Section 2.4 Requested Vertical Barrier Feasibility, Paragraph 4: DTSC is not proposing to build a slurry wall on a 2H:1V slope, regardless of the field conditions. The line of the vertical barrier would be moved to accommodate the site as needed, while the use of existing roads or new benches would be cut into the landfill slopes to facilitate the drilling platforms on flat areas.

This is the first instance in which DTSC has stated that the requested vertical barrier would be moved to accommodate the site as needed. While Chiquita appreciates this change in approach, it does not change the fact that installation of the requested vertical barrier as described in the Order would require drilling on slopes, often 2:1 slopes up to 150 feet in height. Using existing roads or building new benches into the Landfill's slopes would not facilitate drilling platforms because there are no feasible flat areas from which to drill that could support the weight of the heavy machinery required.

12. Section 3.0 Design and Implementation Plan, Bullet points:

- Weight of evidence. The State of California is modeling the size of the reaction based on the data released by the Respondents. If the reaction area has been modeled by any consultant associated with the landfill, on a 3D basis, with any data criteria or by the data-driven criteria from the SOFA, DTSC requests the model and underlying data. Pursuant to paragraph 6.11 of the ISE Order and Health and Safety Code section 78440, DTSC is requesting Respondent to provide this data. Failure to provide the data will be a violation of the ISE Order and of the Health and Safety Code.
- Existing barrier. For the reasons outlined in Comment #6, DTSC cannot verify that the soil barrier is functioning as a barrier to prevent expansion of the SET event. However, DTSC is open to an explanation in a revised RAW of how well the barrier is containing the reaction.
- Ongoing Monitoring. Pursuant to paragraph 6.11 of the ISE Order and Health and Safety Code section 78440, DTSC requests access to all data taken at the landfill to provide an opportunity to verify and replicate this finding of stabilization. Additionally, SCAQMD disagrees that the odors are being managed efficiently. DTSC's position is

that emissions are still affecting the neighboring properties until the SCAQMD notice of violations subside.

- Immediate Mitigation. DTSC cannot accept, verify, or replicate the statement that there is no southern expansion of the reaction without access to all data.

Weight of evidence. One of Chiquita's consultants has modeled the size of the reaction on a 3D basis using data presented in the Reaction Committee Determinations as the underlying data for the model and report. Chiquita provides the requested model and underlying data in **Attachment D**.

Existing barrier. Chiquita will provide an updated explanation in the revised draft RAW detailing the existing barrier's efficacy as a mitigation measure, together with Chiquita's other mitigation measures.

Ongoing monitoring. As explained at the outset of this letter, Chiquita is providing unprecedented data access to Chiquita's raw data. Providing direct access to raw data shows Chiquita's continued commitment to good faith cooperation and to remain as transparent as possible to its regulators.

Chiquita's raw data are objective, reliable measurements. On the other hand, the SCAQMD notices of violation (NOVs) are subjective and unreliable indicators of odor management and are not based on raw data. For example, a Chiquita expert has determined that roughly 20 percent of "verified" SCAQMD odor complaints are unlikely to be related to the Landfill. (P. Sullivan Decl., ECF 82-6, Case No. 2:24-cv-10819-MEMF-MAR, ¶ 46.) Chiquita's expert analyzed the wind directions recorded by the Landfill's MET station. (*Id.* at ¶¶ 44-45.) If any complainants were within 45 degrees of where wind was blowing, it was possible that the odor could potentially have come from the Landfill. If the wind direction was more than 45 degrees from the complainant, then it was considered not possible for the odor to have potentially originated from the Landfill. (*Id.*) Around 20 percent of complainants failed this test, meaning that the complaints were made when wind patterns make it exceedingly unlikely that odors could have come from the Landfill. (*Id.* at ¶ 46.) There was little difference in the accuracy of the "verified" complaints; around 20 percent of complaints failed the wind direction test whether or not the complaints were verified by SCAQMD. (*Id.*) Moreover, a statistician expert reviewed SCAQMD's complaint data and found that "more than half of the 2,486 AQMD complaints that resulted in a Notice of Violation ('NOV') between January 1, 2023 and April 23, 2025 are generated by fewer than 15 unique addresses." (L. Marais Suppl. Decl., ECF 121, Case No. 2:24-cv-10819-MEMF-MAR, ¶ 3(c).)

Further, a comparison between comparable odor surveillance and complaint data earlier this year found that a third of the complaints analyzed were made at a time when nearby odor monitoring found no odors. (P. Sullivan Decl., ECF 82-6, Case No. 2:24-cv-10819-MEMF-MAR, ¶ 48.) An analysis of the odor surveillance intensity data clearly demonstrates that odors have decreased significantly throughout 2025, showing that Chiquita's mitigation measures are working and highly effective at reducing odors in the nearby community. (*See* P. Sullivan Declaration ISO Oppo. to Motion for Prelim. Injunction Ex. 15.)

SCAQMD's enforcement process is also subjective. Humans generally, absent the use of objective tools, are not good at determining the source, character, or hedonic tone of an odor. (R. Pleus

Declaration ISO Oppo. to Motion for Prelim. Injunction at ¶ 51.) These inadequacies of the human nose and the odor interpretation process form the basis of SCAQMD's odor investigation and enforcement efforts at the Landfill. (*Id.*) Each step of the odor nuisance investigation and enforcement process adds additional layers of unreliability: a complainant calls in with a complaint, but the complaint is "verified" by a SCAQMD inspector without any equipment or measuring device. (*Id.* at ¶ 53-56.) This odor complaint verification and source investigation process does not use scientifically backed methodology, transparency, or reproducibility, which contravenes the pillars of the scientific method. (*Id.* at ¶ 52.) As a result, odor complaint data are highly susceptible to biases of inspectors and residents when verifying odors and source tracing. (*Id.*) Now that DTSC has access to Chiquita's raw data, Chiquita invites DTSC to revise its position.

Immediate mitigation. Chiquita has worked with SCS to grant DTSC access to all raw data via SCS eTools and RMC. Chiquita is hopeful that DTSC will use this data to accept, verify, and replicate Chiquita's analysis and conclusions concerning the reaction.

13. Section 3.0 Design and Implementation Plan, Paragraph 3: DTSC understands this section to state that there will be no further mitigation other than potential additional leachate removal and that CCL will rely on the soil barrier documented in the CQA Report to mitigate reaction expansion to Cell 8A and Cell 6. DTSC reminds the Respondents that the vertical barrier is required by the ISE Order. In the absence of a good-faith effort by CCL to comply with the ISE Order, including providing data needed to verify the reaction extent, the department may find CCL out of compliance with the ISE Order.

Chiquita understands that the Order requires installation of the requested vertical barrier. However, as explained at the outset of this letter, Chiquita will not proceed with installing the requested vertical barrier because doing so would endanger human health and the environment, detrimentally affect Chiquita's current mitigation measures, and be technically infeasible. For these reasons, Chiquita cannot in good conscience install the requested vertical barrier.

Moreover, Chiquita's draft RAW described several measures being implemented to mitigate the reaction, including, but not limited to, leachate removal and the existing soil barrier. Several of these mitigation measures were discussed at the outset of this letter.⁴²

Chiquita has been complying in good faith with the Order and has provided the data DTSC has requested on all occasions. On the rare occasion when fulfilling DTSC's data request was infeasible, Chiquita provided a reasonable explanation for its inability to provide the data. As discussed above, Chiquita has worked with SCS Engineers to grant DTSC access to SCS eTools and RMC, which contains Chiquita's raw data.

14. Section 3.0 Design and Implementation Plan, Paragraph 4: This paragraph of the RAW restates that a vertical barrier is infeasible and that the current processes to control the reaction are working. DTSC and CalRecycle have concluded that the reaction is growing.

⁴² See Draft Removal Action Workplan: Protect Cell 8A from Intrusion of Elevated Temperature Landfill Event, prepared by Civil & Environmental Consultants, Inc., Jul. 1, 2025, at Section 2.3.

Alternatives to the barrier can and should be discussed, but a response to protect Cell 8A must be planned.

As the Reaction Committee has continued to conclude for the past several months, and as explained at the outset of this letter, the reaction is stable. Nevertheless, Chiquita will consider alternatives to the requested vertical barrier.

15. Section 3.1. Protection of Cell 8A: This section restates the actions being pursued by the Respondents at CCL to contain the reaction, including items that the Respondents were ordered to install, such as the new 60-mil EVOH HDPE cover.

Chiquita agrees with this characterization of Section 3.1 of the draft RAW. Chiquita's description of the numerous actions being pursued by Chiquita to contain the reaction, including actions and items that Chiquita has been ordered to install, demonstrates Chiquita's good faith compliance with the Order.

16. Section 3.2 Schedule: The last sentence states, "if significant, worsening changes in the SET event are determined, drilling will commence as soon as reasonably possible, but not to exceed 90 days from the relevant Reaction Committee determination". However, there is no definition in the Draft RAW of what is considered "significant, worsening changes" in the SET event. This section must include more clarity, and preferably numerical standards, on what constitutes "significant, worsening changes" in the SET event. Additionally, the future submittal of the Draft RAW must include a Master Schedule of all activities planned for the landfill.

The Reaction Committee considers several different data points and parameters to determine if the reaction is experiencing significant, worsening changes. Any monitoring or measurements taken that indicate the reaction is experiencing significant, worsening changes must be observed for a sustained period; a single data point is not enough to indicate a trend. The table below provides the different data points and parameters that would indicate the reaction is experiencing significant, worsening changes.⁴³

Threshold Criteria Description	Limitation Value
Temperature	
In-Situ Waste Temperature	230 °F
LFG Wellhead Temperature	190 °F
Downwell Liquid/Gas Temperature	230 °F
Temperature of Drill Tailings Removed from Borehole	250 °F
Gas Composition	
Methane-to-Carbon Dioxide Ratio	< 0.75
Hydrogen	> 5.0%
Methane	< 15%
Carbon Monoxide	> 1,500 ppm

⁴³ Soil Reaction Break/Barrier Plan, prepared by SCS Engineers, Nov. 26, 2024.

Chiquita will include a Master Schedule in the revised draft RAW.

17. Section 3.3, Construction Quality Assurance Plan: Please provide DTSC a reference copy of what is referend [sic] to as “...the Site’s standard operating procedure”, as this reference is ambiguous.

Chiquita’s reference to “the Site’s standard operating procedure” is not referring to a document, but rather to good engineering practices and industry standards being implemented at the site.

18. Section 3.4, Required Permits: Appendix G lists “Landfill Gas Condensate and Leachate Collection/Storage System (Permit No. G66132, A/N 613131)”. Please verify that this permit is still active.

Permit No. G66132, A/N 613131 is still active.

19. Section 3.5, Operations and Maintenance Plan – Appendix G: The attached Leachate Plan is out of date. The revised Draft RAW will need to include a Leachate Plan that has been updated to accommodate the removal of Tank Farms 7 and 9 that were consolidated into Tank Farm 13.

Chiquita is not in the process of updating the Leachate Management Plan pursuant to the United States Environmental Protection Agency’s (EPA) Unilateral Administrative Order issued to the Landfill, EPA Docket No. RCRA 7003-09-2024-0001 and CERCLA 106-09-2024-05 (UAO). EPA has not yet approved the Leachate Management Plan. It is still in draft form. Given that the Leachate Management Plan is still in draft form and is being developed under the UAO, Chiquita does not believe it should be revised absent EPA’s approval. Chiquita will provide DTSC with a copy of the updated Leachate Management Plan once it has been approved by EPA pursuant to the UAO.

CalRecycle’s General Comments

Chiquita responds to CalRecycle’s general comments at the outset of this letter.

CalRecycle’s Technical Comments

1. CCL claims that a partial soil barrier is installed between Cells 6 and 8; however, the submitted drawings show that the soil barrier is located in Modules 4 and 5. This demonstrates there is just a 5-foot cover above this area and no vertical soil wall between Cells 6 and 8. Based on CCL analysis, there is no internal barrier that will prevent the reaction from spreading to the entire facility.

As stated above, the CQA report and related drawings show that the existing soil barrier is located between Cells 6 and 8. As explained in the draft RAW, the existing soil barrier would, in conjunction with the Landfill’s existing mitigation measures, prevent the reaction from spreading to Cell 8A because soil is an inert material that is not subject to biological, thermal, or oxidative degradation.

The existing soil barrier is not meant to function as a substitution for the requested vertical barrier on its own. Rather, as explained above, the existing soil barrier is one of several existing engineered controls specific to the Landfill that, all together, effectively manage the reaction.

2. This aforementioned cover does not prevent the SET Event from passing underneath the cover.

As explained above and in the revised draft RAW, the existing soil barrier is not meant to function as a 1-to-1 substitute for DTSC's requested vertical barrier.

3. The CCL's consultant indicates that the cutoff barrier soil borings would need to be more than 200 ft deep, and this is not feasible. This again is confusing, given that the waste at the interface between Cells 6 and 8 is approximately 80 ft deep and is very achievable.

The requested vertical barrier would require borings of approximately 250 feet deep. The drill depths at the location recommended in Figure 7 of the Stark Memo for installation of the requested vertical barrier are at 240 feet. Moreover, an "effective" vertical barrier, which is infeasible to construct, cannot stop at the 80 feet deep mark. An "effective" vertical barrier would require an additional buffer of several tens of feet beyond 80 feet to ensure the reaction could not expand from underneath since the waste depth in this area is significantly deeper than DTSC and CalRecycle believe. Additionally, due to the terrain and topography of the area, a slope would need to be excavated through the landfill mass and back up to the existing grade to install the vertical barrier, even at a depth of 80 feet.

4. The CCL claims the US EPA "does not include construction of this type of barrier in its list of Potential Management and Mitigation Strategies for Elevated Temperature Landfill conditions." The cited one-page document is not a guidance document. On July 16, 2025, Dr. Max Krause of the US EPA's Research and Development Division gave a webinar and stated in the presentation that one of the Potential Corrective Actions is "thermal barriers (grout or vertical walls)."

The citation is to EPA's official page on Elevated Temperature Landfills and is considered EPA's expert opinion on appropriate ETLF management and mitigation strategies. Chiquita asks that CalRecycle provide a copy of the slide deck from the referenced webinar given by Dr. Max Krause on July 16, 2025. Even so, a vertical barrier is a potential corrective action that should only be implemented if feasible, effective, and safe, which is a site-specific analysis. Chiquita's analysis of the construction of the requested vertical barrier at the Landfill shows in no uncertain terms that construction of the requested vertical barrier would be infeasible, impractical, and unsafe.

5. The CCL indicates that it is concerned that the construction of a vertical wall at the required location will result in additional impacts to the surrounding community in the form of detectable emissions. CalRecycle staff share the same concern but note that the intention is to install the barrier in an area not currently affected by the reaction.

Construction of the requested vertical barrier would require drilling into waste. Any drilling into waste has the potential to increase emissions, regardless of whether the area is affected by the reaction. Additionally, the magnitude of drilling required to install the requested vertical barrier could ultimately impact the reaction or the success of the mitigation measures in place to manage the reaction by other means, even if the reaction is not directly drilled into. Chiquita's concerns are not unfounded. As explained in Chiquita's November 7, 2025 letter to DTSC responding to the agency's request for an updated geomembrane cover deployment schedule, Chiquita saw negative impacts to its existing mitigation measures during the push to deploy the initial 15 additional acres

of the geomembrane cover in Segments 1, 2, and 3 of the Landfill. Chiquita saw an increase in temperatures measured at certain wells and temperature monitoring probes because landfill gas extraction wells and dewatering pumps had to be taken offline to install the geomembrane cover. These temperatures went back down as soon as the landfill gas extraction wells and dewatering pumps in the active cover deployment areas came back online.

CalRecycle's Administrative Comments

1. The Final RAW should be signed by a registered professional engineer in the State of California. The current submittal is an unsigned draft.

Chiquita agrees that the final RAW should be signed by a registered professional engineer in the State of California. Because section 5.3 of the Order requires the RAW to be submitted in draft form, Chiquita's submittal on July 1, 2025 was transmitted as an unsigned draft.

2. The report references a footnote "Declaration of Craig H. Benson in Opposition to Plaintiff's Motion for Preliminary Injunction, Case No. 2:24-cv 10819-MEMF-MAR, Dated July 17, 2025," however, it does not provide the referenced document to review.

As stated above, Chiquita provides the declaration of Dr. Craig Benson in **Attachment B**.

CalRecycle's Conclusion and Recommendations

As explained at the outset of this letter, it is infeasible, impractical, and unsafe to construct the requested vertical barrier. Additionally, there is no data supporting the notion that the reaction may expand to Cell 8A, necessitating any sort of barrier construction. CalRecycle's conclusion and recommendations acknowledge this by stating "if a soil buttress must be constructed" (emphasis added) and providing two alternatives to the construction of the requested vertical barrier in subparagraphs (A) and (B). If CalRecycle believed that a vertical barrier must be constructed to control the reaction, it would not have provided an opportunity for Chiquita to take alternate action.

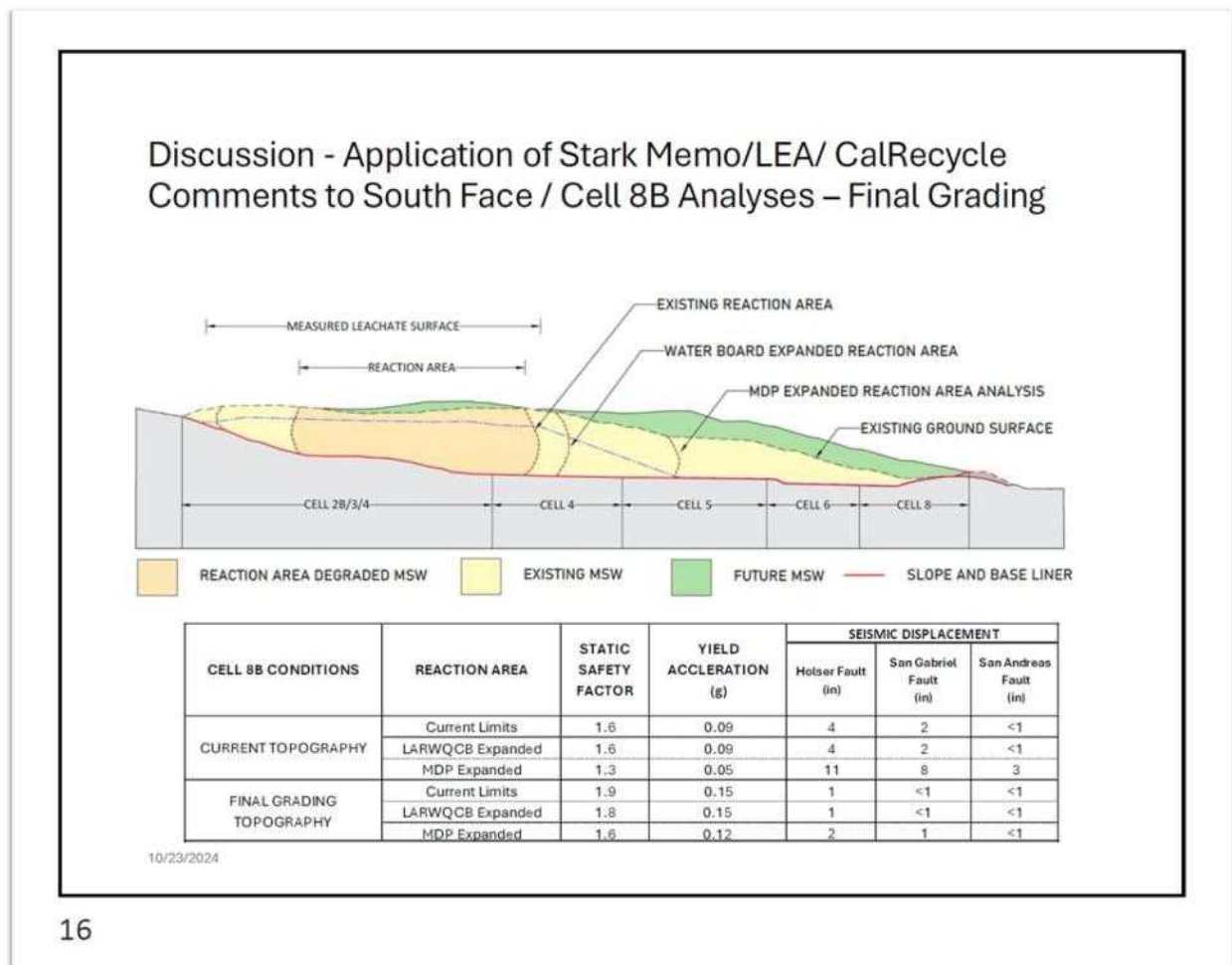
- A. The CCL should complete a comprehensive global slope stability study for areas where critical infrastructure is located (e.g., temporary Tank Farm 13 located in Cell 8B) assuming the reaction encompasses the entire waste management unit. The CCL's consultant GLA, in a presentation to USEPA in 2024, indicating that if the reaction expanded to the interface of Module 4/5, certain slope stability factors start dropping below the acceptable factor of safety.

Chiquita is in the process of completing the requested Slope Stability Workplan covering a comprehensive global slope stability study.

Additionally, Chiquita and its consultant Geo-Logic Associates (GLA) dispute CalRecycle's claim that GLA made a statement to EPA in 2024 indicating that if the reaction at the Landfill expanded to the interface of Module 4/5, unacceptable safety factors would be implicated. GLA did not make such a statement. It is factually wrong. Chiquita and GLA believe that CalRecycle may instead be referring to a different statement made by GLA during a meeting held on October 23, 2024. The analytical results presented at the meeting, reproduced below, considered both current topography and final grading topography under the following reaction area assumptions:

1. The current (October 2024) reaction area limits.
2. The expanded reaction area limits specified by the Water Board.
3. The greatly expanded reaction area limits that were assumed for the Master Development Plan (MDP) analyses. These limits extended about one third to one half of the way into Cell 5 and are beyond the interface of Module 4/5.

Under the most conservative and hypothetical scenario, the results indicated a short term (current topography) static safety factor of 1.3. The static safety factor increases to 1.6 when fill is placed to final grade. Under conventional standards of practice, temporary static safety factors of 1.3 are often considered acceptable, especially if it is demonstrated that the safety factor will increase with time. Moreover, as described below, subsequent analyses that extended the reaction area to the Module 4/5 interface showed static safety factors of 1.5 or greater and acceptable seismic deformations for all conditions that were analyzed.



CalRecycle apparently ignored the information in the GLA December 9, 2024 “Information to Address Regulatory Agency Western and Southern Slope Stability Evaluation Comments” letter report that presented analyses using considerably more information than the analyses that were

Chiquita Canyon, LLC Response to DTSC Comments on Draft RAW

November 21, 2025

Page 30 of 31

discussed at the October meeting. The sections that were analyzed and the analytical results are shown below. These analyses extended the reaction area to the boundary of Module 4 and Module 5, and the results show acceptable static safety factors and seismic displacements for all conditions that were analyzed.

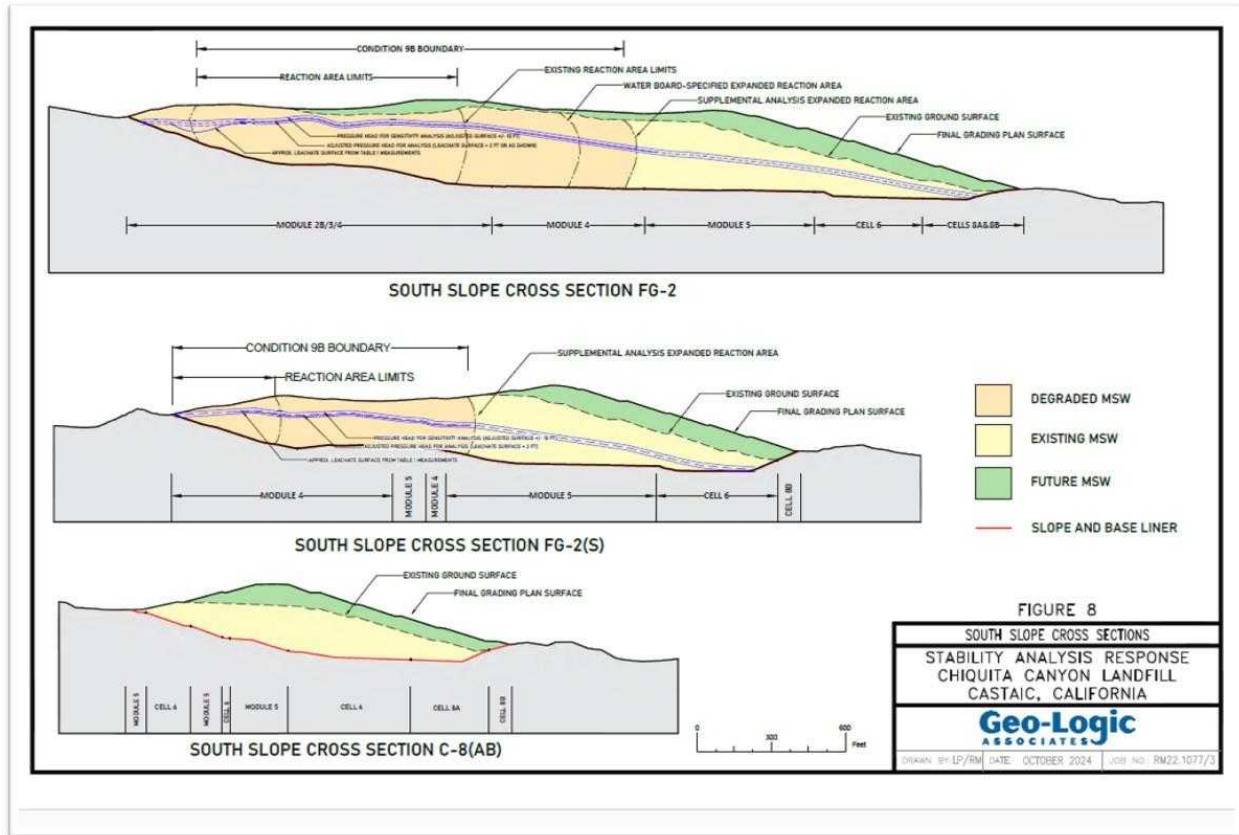


Table 7 SUMMARY OF CELL 8A/8B AND SOUTH SLOPE SUPPLEMENTAL ANALYSIS RESULTS Chiquita Canyon Landfill Castaic, California												
REACTION AREA LIMITS	GRADING	STATIC SAFETY FACTOR	SEISMIC DISPLACEMENT									
			Yield Acceleration (g)	Holser Fault			San Gabriel Fault			San Andreas Fault		
				Acceleration @ 1.5T _g (g)	M	Estimated Displacement (in)	Acceleration @ 1.5T _g (g)	M	Estimated Displacement (in)	Acceleration @ 1.5T _g (g)	M	Estimated Displacement (in)
South Slope Section FG-2												
Expanded Reaction Limits	Existing Topography	1.7	0.12	0.22	6.8	2	0.20	7.3	1	0.11	8.2	<1
	Final Grading Plan	1.6	0.12	0.22	6.8	2	0.20	7.3	<1	0.11	8.2	<1
South Slope Section FG-2(S)												
Expanded Reaction Limits	Existing Topography	1.5	0.12	0.28	6.8	3	0.23	7.3	1	0.15	8.2	<1
	Final Grading Plan	1.6	0.13	0.27	6.8	2	0.22	7.3	1	0.14	8.2	<1
Cell 8A/8B Section AB												
Not in Reaction Area and Expansion to Section Not Reasonably Foreseeable	Existing Topography	1.6	0.10	0.35	6.8	5	0.28	7.3	4	0.18	8.2	1
	Final Grading Plan	1.9	0.17	0.30	6.8	1	0.25	7.3	<1	0.15	8.2	<1

Chiquita Canyon, LLC Response to DTSC Comments on Draft RAW

November 21, 2025

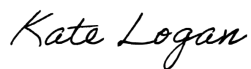
Page 31 of 31

B. No active waste disposal can occur within 500 ft. of the defined reaction area.

Chiquita has not accepted waste for disposal since January 1, 2025. Chiquita's working face is currently close to 500 feet away from the data-driven boundary line, but Chiquita cannot guarantee that it will always be more than 500 feet away. Such a requirement would prevent Chiquita from filling the Landfill in a manner that maintains positive drainage and would instead leave open a valley that would interfere with this drainage. However, Chiquita can commit to not filling any closer than necessary to the data-driven boundary line to maintain positive drainage at the Landfill.

If you have any questions, please do not hesitate to contact me at (346) 807-5547 or Kate.Logan@WasteConnections.com.

Sincerely,



Kate Logan
Senior Remediation Project Manager
Chiquita Canyon Landfill

Enc: Attachment A—Draft Master Schedule
Attachment B—Declaration of Dr. Benson
Attachment C—Figure Depicting Tank Farm
Attachment D—Model of Reaction and Data

cc: Steve Cassulo, Chiquita Canyon
John Perkey, Chiquita Canyon
Dylan Smith, Chiquita Canyon
Thanne Berg, Department of Toxic Substances Control
Tim Crick, Department of Toxic Substances Control
Christopher Kane, Department of Toxic Substances Control
Johnathon Crook, Department of Toxic Substances Control
Lisa Winebarger, Department of Toxic Substances Control
Bridget Floyd, Department of Toxic Substances Control

ATTACHMENT A

Draft Master Schedule

The Department of Toxic Substances Control's (DTSC) October 15, 2025 letter directed Chiquita Canyon, LLC (Chiquita) to submit a draft Master Schedule.¹ Chiquita provides the requested draft Master Schedule below, which is subject to change based on actual conditions at the Chiquita Canyon Landfill (the Landfill). This draft Master Schedule focuses on the scope of DTSC's Order, including the tasks scheduled for completion pursuant to the three Removal Action Workplans (RAWs) required by the Order as well as DTSC's data requests issued pursuant to section 6.11 of the Order.

Geomembrane Cover Deployment (60-mil EVOH/HDPE)

The following primary tasks are currently being executed as part of the cover deployment process; however, as deployment continues, it is possible that efficiencies will be established that may result in changes to the timing of tasks needed to complete deployment of the geomembrane.

1. Disconnect wellheads and piping
2. Relocate gas header piping
3. Prepare subgrade
4. Deploy liner
5. Construct Access Road
6. Reconnect gas header and wells
7. Install LFG boots

As previously stated in Chiquita's November 7, 2025 response to DTSC's request for an updated cover deployment schedule, which Chiquita incorporates herein, several factors will continue to impact deployment progress, including but not limited to weather conditions through the rainy season, technical challenges, and the need to coordinate with multiple contractors, personnel, and competing and concurrent projects. Until the rainy season concludes, it is difficult to accurately project how cover deployment will progress. All dates below are approximate and subject to weather conditions.

- Deployment Schedule
 - Segments 1 and 2 – Completed September 2025
 - Segment 3 (partial) – Completed November 2025
 - Segment 3 (remaining 1.7 acres) – December 12, 2025

¹ DTSC General Comment #1 ("The future submittal of the Draft RAW must include a Master Schedule of all activities planned for the landfill and a draft of the Master Schedule must be submitted to DTSC within seven (7) days for review. This Schedule shall also include timing of all responses to data requests."). Chiquita requested an extension to submit this draft Master Schedule as part of this response to DTSC's October 15, 2025 letter.

- Install 16 acres of 60-mil EVOH geomembrane over the top of the existing 30-mil geomembrane cover, which involves disconnecting and reconnecting gas headers and wells, as needed, over the geomembrane cover – March 31, 2026
- Segments 4 through 15 – November 30, 2026
- Segments 16 through 20 – July 31, 2027 (subject to weather conditions)
- Communication and Notification Schedule for Deployment Progress
 - Provide regular updates to DTSC through:
 - Weekly technical calls (Tuesdays)
 - Written weekly updates (Fridays)
 - Bi-weekly updates regarding estimated upcoming project timelines (every other Friday)

Interim Relocation and Stabilization of Containerized Waste (Tank Farm 9)

As of November 21, 2025, Tank Farm 9 has been relocated to Cell 8B. The last primary task associated with this RAW is to obtain a grading permit from Los Angeles County Public Works (Public Works).

- Permitting Schedule
 - Submitted grading permit application – August 4, 2025
 - Received comments on grading permit application from Public Works – September 25, 2025
 - Submitted notification for Conditional Authorization of hazardous waste treatment in Tank Farm 13 to the CUPA – November 20, 2025
 - Respond to Public Works’ comments on grading permit application
 - Obtain grading permit – To be determined by Public Works

Protection of Cell 8A From Intrusion of ETLF (Existing Mitigation Measures and Proposed Alternatives)

As of November 21, 2025, Chiquita has elected to consider alternatives to the requested vertical barrier in the Order. Because these alternatives have not yet been selected or finalized, Chiquita reserves the right to supplement the below schedule with additional tasks associated with the selected and finalized alternatives. The schedule below includes primary tasks associated with Chiquita’s existing mitigation measures.

- Existing Mitigation Measures Schedule
 - Gas Well Drilling
 - Landfill gas vertical extraction well drilling will continue.
 - There are 15 additional wells to be drilled in the Tank Farm 7 area that were previously inaccessible. The drilling has already started, and there are 3 wells that have yet to be drilled.

- Borehole logs are submitted to the South Coast Air Quality Management District (South Coast AQMD) in a monthly report pursuant to Condition 8 of the [Stipulated Order for Abatement in Case No. 6177-4 \(“SOFA”\)](#) (see Chiquita’s Odor Mitigation website (<https://chiquitacanyon.com/odor-mitigation/>) under Odor Maintenance Logs (“Stipulated Order Condition 8 (monthly reports)”)).
- Weekly well drilling updates for the drilling of landfill gas vertical extraction wells and temperature monitoring probes are submitted to South Coast AQMD pursuant to SOFA Condition 15(c) (see Chiquita’s Odor Mitigation website under Odor Maintenance Logs (“Stipulated Order Condition 15(c) (weekly well drilling updates)”)).
- Rig parts that allow for deeper drilling have been installed and the rig is now capable of drilling wells up to 195 feet in depth, subject to on-site conditions.
- Sonic Drill Rig – TMPs and SVEs
 - The sonic drill rig finished drilling TMP-36 to TMP-40 on September 24, 2025. Chiquita ordered temperature sensors and remote telemetry heads for the drilled TMPs (TMP-36 to TMP-40). The vendor was delayed in shipment. Chiquita expects to receive the equipment by November 24, 2025, and once they arrive, Chiquita expects to install them by December 5, 2025, subject to weather conditions. The thermocouples had to be ordered after drilling was completed because the Local Enforcement Agency (LEA) directed Chiquita to use an equation that depends on the final installed TMP depth to ensure equal spacing among the thermocouples.
 - The mobilization of the drill rig and widening of the existing perimeter road to allow drill rig access required more time than initially anticipated to begin the installation of soil vapor extraction (SVE) wells. The installation of SVE well SW-3S/M was completed on October 23, 2025, and SW-3D on October 27, 2025.
 - Drilling of the remaining temperature probes (TMP-22, TMP-23, and TMP-33) is being conducted concurrently to expedite the projects to the extent feasible.
 - The sonic drill rig was redirected to complete the installation of TMP-23, while the road work continued for the SVE wells.
 - As TMP-23 was being completed, Chiquita prepared the west side road for the drilling of the SVE wells.
 - Over the upcoming weeks, the sonic drill rig will move between the SVE wells and TMPs to complete both projects.
 - TMP-23 was completed on October 22, 2025, and TMP-22 was completed on October 31, 2025.

- Due to the current and expected rain conditions on-site, the west side road is currently inaccessible. We anticipate drilling will resume on December 1, 2025, after the Thanksgiving holiday.
- Chiquita and the LEA held a meeting on October 17, 2025, and determined where TMP-33 should be located. This location has been staked out and the additional work required to allow the drill rig to access this location has been completed.
- Please also see the weekly well drilling updates for the drilling of landfill gas vertical extraction wells and temperature probes submitted to South Coast AQMD pursuant to SOFA Condition 15(c) (see Chiquita's Odor Mitigation website under Odor Maintenance Logs ("Stipulated Order Condition 15(c) (weekly well drilling updates)").
- See the weekly TMP reports submitted to the LEA pursuant to [the LEA's June 6, 2024 Compliance Order](#) and to the US EPA (see Chiquita's Odor Mitigation website under Reports, Permits, and Other Documents, LEA ("Weekly submittals of all temperature monitoring probe data in accordance with Milestone 1B"))).
- Flares/TOxs
 - The HERO thermal oxidizer (TOx) is now online, and the work to relocate the Parnel TOx has been completed. All three TOx are currently running.
 - The ongoing discussion with South Coast AQMD has resulted in Chiquita modifying the permit applications for the 3 gas destruction units to be classified as flares, with verbal agreement from South Coast AQMD staff on September 24, 2025, supporting the ongoing operation of the 3 units until Flares 4 and 5 are online. Chiquita submitted an application for a permit to construct/operate and a Title V permit modification for Flare 4 to South Coast AQMD on October 30, 2023. This flare will provide additional critical destruction capacity once installed. Under the current SOFA, Chiquita would need to take down Flare 1 once Flare 4 is permitted and operational.
 - Chiquita is working through problems with the Los Angeles County Electronic Permitting & Inspections (EPIC LA) system regarding the review and approval of grading permits for Flare 4.

Data Requests (Order Section 6.11)

As of November 21, 2025, Chiquita has provided DTSC with access to data pursuant to Order section 6.11 on the following dates. Several of these documents were previously submitted to DTSC and other regulators.

- Soil compaction results for the soil placed in Cell 8B – May 7, 2025
- Follow up summary of soil compaction results – June 3, 2025

- AutoCAD files for the January 2023 topographic map and subgrade map – June 12, 2025
- Surface and base elevations for TMP-21 through TMP-35 – July 2025
- Proposed data delivery schedule pursuant to Order section 6.11 – July 21, 2025
- Raw gas data collected for the Landfill from August 20, 2024 to August 20, 2025 – August 25, 2025
- Topography of the surface of the Landfill in AutoCAD format for August 2025, ground survey points to fix the 2025 topography and properly orient the AutoCAD data, and boring logs for TMP-01 through TMP-21 and TMP-24 through TMP-35 – September 8, 2025
- EVOH Construction Quality Assurance documents – September 25, 2025
- Spreadsheet with latitudes and longitudes for a specific list of wells – October 14, 2025
- Data Management Plan – October 21, 2025 (originally submitted to US EPA and the RMAC in July 2024)
- Raw data via SCS eTools – October 30, 2025
- Raw data via RMC – November 3, 2025

ATTACHMENT B

Paul S. Chan (SBN 183406)
pchan@birdmarella.com
Ariel A. Neuman (SBN 241594)
aneuman@birdmarella.com
Shoshana E. Bannett (SBN 241977)
sbannett@birdmarella.com
BIRD, MARELLA, RHOW,
LINCENBERG, DROOKS &
NESSIM, LLP
1875 Century Park East, 23rd Floor
Los Angeles, California 90067-2561
Telephone: (310) 201-2100

Jacob P. Duginski (SBN 316091)
jduginski@bdlaw.com
BEVERIDGE & DIAMOND P.C.
333 Bush Street, Suite 1500
San Francisco, CA 94104
Telephone: (415) 262-4000

*Attorneys for Defendants Chiquita
Canyon, LLC, Chiquita Canyon, Inc. and
Waste Connections US, Inc.*

UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA, WESTERN DIVISION

THE PEOPLE OF THE STATE OF
CALIFORNIA, by and through Dawyn
R. Harrison, County Counsel for the
County of Los Angeles, and THE
COUNTY OF LOS ANGELES,

Plaintiffs,

vs.

CHIQUITA CANYON, LLC, a
Delaware limited liability company;
CHIQUITA CANYON, INC., a
Delaware corporation; and WASTE
CONNECTIONS US, INC., a Delaware
corporation,

Defendants.

Kaitlyn D. Shannon (SBN 296735)
kshannon@bdlaw.com
Megan L. Morgan (*pro hac vice*)
mmorgan@bdlaw.com
James B. Slaughter (*pro hac vice*)
jslaughter@bdlaw.com
BEVERIDGE & DIAMOND P.C.
1900 N Street, NW, Suite 700
Washington, DC 20036-1661
Telephone: (202) 789-6040

Katelyn E. Ciolino (*pro hac vice*)
kciolino@bdlaw.com
BEVERIDGE & DIAMOND P.C.
825 Third Avenue, 16th Floor
New York, NY 10022
Telephone: (212) 702-5428

CASE NO. 2:24-cv-10819-MEMF-
MAR

**DECLARATION OF CRAIG H.
BENSON, PHD, PE, BCGE, BCEE,
NAE**

Filed Concurrently with Opposition to
Motion for Preliminary Injunction

Date: July 17, 2025

Time: 10:00 a.m.

Assigned to Hon. Maame Ewusi-
Mensah Frimpong, Courtroom 8B

DECLARATION OF CRAIG H. BENSON, PhD, PE, BCGE, BCEE, NAE

I, Craig H. Benson, PhD, PE, BCGE, BCEE, NAE, declare:

1. I have been engaged by Defendants' Chiquita Canyon, LLC, Chiquita Canyon, Inc., and Waste Connections US, Inc. (collectively, "Chiquita Defendants") to provide expertise regarding the Chiquita Canyon Landfill (the "Landfill"), in support of Defendants' opposition to Plaintiffs' Motion for Preliminary Injunction in the above-captioned action. This Declaration sets forth my professional opinions regarding the Chiquita Canyon Landfill's ongoing Elevated Temperature Landfill ("ETLF") event. My opinions in this Declaration are based on industry standards and are stated to a reasonable degree of scientific and engineering certainty. If called as a witness, I could and would testify competently to the material facts and opinions herein.

2. This Declaration is based on my assessments to date, which were conducted over a limited time frame. With additional time, I could have and would have done additional analysis. My opinions could change with additional information and analysis. I reserve the right to update my opinions should additional information become available.

3. I hold the titles of Wisconsin Distinguished Professor Emeritus at the University of Wisconsin-Madison and Dean of Engineering Emeritus at the University of Virginia. I have a PhD in engineering with a focus on landfills and waste containment, and nearly 40 years of experience in engineering research and practice related to municipal solid waste ("MSW") landfills and solid waste containment systems as a Wisconsin Distinguished Professor Emeritus at the University of Wisconsin-Madison and as Dean of Engineering Emeritus at the University of Virginia. I am a board-certified environmental engineer by the American Academy of Environmental Engineering and Scientists ("AAEES") and board-certified geotechnical engineer by the Geo-Institute of the American Society

1 of Civil Engineers. I am an elected member of the US National Academy of
2 Engineering (“NAE”) and am past-Chair of NAE Section 4 on Civil and
3 Environmental Engineering.

4 4. I have extensive experience working on landfills and waste
5 containment systems for a diversity of waste streams at locations throughout the
6 United States, Canada, South America, Europe, Africa, Japan, Australia, and New
7 Zealand. This experience has provided me with a broad and detailed knowledge of
8 operational and design issues for landfills and other waste containment systems.

9 5. I served as a co-Principal Investigator on an expert team of engineers
10 charged by the Environmental Research and Education Foundation (“EREF”) to
11 develop an understanding of MSW landfills with elevated temperatures that persist
12 over large areas, which are referred to as ETLFs. This expert team, referred to as
13 the EREF ETLF team, was charged with understanding causative mechanisms for
14 the persistent high temperatures at ETLFs, identifying strategies to prevent ETLFs,
15 and recommending best management practices for ETLFs.

16 6. I have been engaged in evaluating many of the major ETLFs over the
17 past two decades, including those at Countywide Landfill, Congress Landfill,
18 Waimanalo Gulch Landfill, Bridgeton Landfill, Middle Point Landfill, and Bristol
19 Landfill. I am currently engaged as the expert engineer for the Bristol Landfill in
20 Bristol, Virginia, providing oversight, review, and recommendations associated
21 with managing the Bristol ETLF. I am also engaged as an engineering expert
22 evaluating conditions and practices at the Middle Point Landfill ETLF in
23 Murfreesboro, Tennessee. I have published referred research papers regarding
24 mechanisms contributing to heat accumulation in ETLFs, thermal properties of
25 MSW affecting heat transfer in ETLFs, pyrolytic reactions in ETLFs, and
26 temperature-dependent compression and settlement of MSW. Causative
27 mechanisms and best management practices to address ETLFs was one of the
28

1 lecture themes for my 2024 Kappe Lecture series tour for the American
2 Association of Environmental Engineers and Scientists.

3 7. My education, training, professional background, and expertise are
4 summarized in my curriculum vitae, attached as **Exhibit A**.

5 8. I have been engaged as an expert by a broad range of private sector
6 and public sector entities. My public sector engagements include the US
7 Environmental Protection Agency, US Department of Energy, US Nuclear
8 Regulatory Commission, US Department of Defense, Wisconsin Department of
9 Natural Resources, Iowa Department of Natural Resources, Missouri Department
10 of Natural Resources, Tennessee Department of Environmental Conversation,
11 Michigan Department of Environmental Quality, Idaho Department of
12 Environmental Quality, Utah Department of Environmental Quality, Texas
13 Commission on Environmental Quality, Montana Department of Environmental
14 Quality, Wyoming Department of Environmental Quality, and the Virginia
15 Department of Environmental Quality. My private sector engagements include
16 Republic Services Inc., Waste Management Inc., GFL Inc., Cleveland-Cliffs Inc.,
17 Bayer Corporation, Simplot Corporation, Morrow Energy, Evergy Inc., Energy
18 Fuels Resources Inc., Alcoa, and the Electric Power Research Institute.

19
20 **Background on Elevated Temperature Landfills**

21 9. Landfills are highly engineered containment facilities for solid wastes
22 that include engineered barriers and control systems for managing liquids and
23 gases associated with the waste with the objective of protecting groundwater and
24 air. Modern MSW landfills include engineered liners beneath the waste that retain
25 leachate (contaminated water released from the waste) and engineered covers
26 above the waste to control the ingress of precipitation and egress of gases.
27

1 Leachate collection and treatment systems are used to collect the leachate
2 contained on the liner surface, followed by treatment to remove contaminants prior
3 to discharge. Typically, leachate treatment occurs offsite. Gas collection and
4 control systems (“GCCS”) are used to collect gas emitted from the waste and to
5 treat the gas so that it can be discharged to the atmosphere.

6 10. A portion of the organic fraction of MSW placed in a landfill
7 undergoes microbial decomposition. This process produces landfill gas (“LFG”),
8 which is comprised primarily of methane and carbon dioxide under typical
9 conditions along with much smaller fractions of other constituents. Under normal
10 conditions, LFG is collected and treated by the GCCS prior to discharge. In some
11 cases, the treatment system may include combustion or conversion of the methane
12 to produce renewable energy. The microbial decomposition process also produces
13 heat, which results in the waste mass temperature being above ambient
14 atmospheric temperatures. Under normal conditions, heat does not accumulate to a
15 level at which the biological process is inhibited.

16 11. Water is present in waste due to the ingress of precipitation after
17 disposal in the landfill and wetting that may have occurred prior to disposal. Water
18 in contact with waste solids and gases is referred to as leachate. Leachate contains
19 a variety of inorganic and organic constituents that have the potential to impact
20 groundwater and other water resources, and therefore is collected for treatment.
21 Leachate drains by gravity to the bottom of the landfill, where the liner redirects
22 flow laterally to a sump. Leachate in the sump is removed by a pump. In some
23 cases, when drainage within the waste is constrained, vertical extraction wells with
24 pumps are installed in the waste to remove leachate. The wells generally are also
25 used to collect LFG, and are referred to as dual-phase extraction wells, with the
26 two phases being leachate and LFG.

12. The EREF ELTF research team defined ETLFs as MSW landfills with gas wellhead temperatures substantially in excess of 65 °C (150 °F) that persist over a large area for a sustained period of time. This definition has been broadly adopted by practitioners and environmental regulators throughout the United States. The elevated temperatures have a variety of impacts, including alterations in gas composition, higher rates of settlement, alterations in leachate chemistry, and generation of odors. ETLFs differ from MSW landfills with a limited number of wells operating under a higher operating value (HOV) exemption, which are landfill gas wells permitted to operate at a temperature in excess of 55 °C (131 °F). An informal survey I conducted indicated that approximately one-third of the MSW landfills in the United States have at least one gas well operating under an HOV exemption.

13. ETLFs are uncommon. The first ETLF occurred circa 2006. Since then, approximately ten to 15 ETLFs have been recognized. Some of these are described in a fact sheet issued by the US Environmental Protection Agency (“USEPA”)¹.

14. ETLFs occur when exothermic, or heat-releasing, processes within the waste mass generate heat at a rate that is faster than the rate at which the heat can dissipate into the surrounding environment. Consequently, the heat accumulates in the waste, resulting in increasing temperatures. The heat spreads and waste temperatures increase until an equilibrium is reached between the rate of heat generation and the rate heat dissipation.

15. Exothermic reactions are the source of heat in ETLFs. These reactions are known at some ETLFs, such as the exothermic reactions associated with

¹ USEPA, When Does a Municipal Solid Waste Landfill Become an Elevated Temperature Landfill (ETLF)? (Jan. 2022), https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=CESER&dirEntryId=354569.

1 aluminum metal in aluminum processing wastes at the Countywide Landfill in
2 Sparta, Ohio and the Middle Point Landfill in Murfreesboro, Tennessee. At other
3 landfills, such as the Congress Landfill in Chicago, Illinois or and the Bristol
4 Landfill in Bristol, Virginia, the exothermic reactions have not been identified
5 conclusively. The exothermic reactions responsible for ETLFs are generally
6 believed to be abiotic (non-biological in origin) with origins in hydration and
7 carbonation of reactive surfaces in the waste (e.g., some coal combustion and
8 incinerator ashes can have reactive surfaces) and potentially exothermic pyrolysis.

9 16. Very wet or saturated waste and high leachate levels are common in
10 ETLFs, precluding combustion reactions (smoldering combustion, fire) as
11 significant sources of heat. Consequently, the mechanisms causing ETLFs
12 generally are different from landfill fires or smoldering combustion, which are
13 more common near the landfill surface where oxygen is available. Combustion
14 generates charred waste, combustion odors, and gas laden with particulate (smoke),
15 each of which is not common at ETLFs. Strategies to address heat in ETLFs
16 necessarily are very different from those used to manage combustion in MSW.

17 17. ETLFs typically have several common characteristics in addition to
18 the elevated waste and landfill gas temperatures. These include (1) landfill gas
19 composition that differs from that of gas released from conventional microbial
20 decomposition processes in MSW; (2) elevated leachate generation rates; (3)
21 elevated concentrations of inorganic and organic constituents and suspended solids
22 in the leachate; and (4) higher rates of compression of the MSW.

23 18. The elevated temperatures in ETLFs suppress the methanogenic
24 microbial community in MSW associated with decomposing the organic matter in
25 MSW under typical MSW landfill conditions. Consequently, the LFG in ETLFs
26 generally has lower methane content and higher carbon dioxide content compared
27
28

1 to LFG in a landfill operating under conventional conditions with methanogenic
2 microbial decomposition.

3 19. LFG in ETLFs often contains reduced sulfide compounds that are
4 highly odiferous, even at low concentrations. Consequently, LFG from ETLFs has
5 a distinct pungent odor that is different from conventional LFG. Dimethyl sulfide
6 (DMS) is one of the most common of these odiferous reduced sulfide compounds
7 in LFG at ETLFs.

8 20. The elevated temperatures in an ETLF soften the solid components in
9 MSW, reducing the stiffness of the solid matrix in MSW, resulting in increased
10 magnitude and rate of settlement. The softening of the solid matrix also results in
11 the release of moisture that is typically bound within the pores of the waste. This
12 release of moisture is responsible for much of the higher leachate generation rates
13 associated with ETLFs.

14 21. The elevated temperatures and the absence of oxygen in MSW in an
15 ETLF may result in pyrolysis, which is defined as the thermal decomposition of
16 organic matter in the absence of oxygen. The pyrolytic decomposition process
17 results in the release of constituents from the solids to the leachate, a factor
18 responsible for the elevated concentrations of organic constituents in leachate at
19 ETLFs. These organic constituents often include acetone, benzene, toluene, and
20 ketones. Pyrolysis in ETLFs generally is endothermic, meaning that the
21 decomposition process consumes energy. However, pyrolysis can be exothermic
22 (energy and heat releasing) under certain pressure and energy conditions. The role
23 of exothermic pyrolysis in ETLFs is a topic of current research.

24 22. A crock pot is a useful analog to an ETLF. A crock pot is filled with
25 organic solid matter (meats, vegetables, etc.), with the pore spaces between the
26 solids filled with liquid (broth). When the crock pot is first filled, the solids are
27 relatively firm and rigid, and the pore water between the solids is dilute. A lid is
28

1 placed on the upper surface, constraining the release of heat and moisture. Heat is
2 applied to the contents in the pot. This heat for cooking softens the solid matter,
3 which releases substances to the broth. The process also releases an aroma. After a
4 period of sustained heat application, the solid matrix is soft and compressible, and
5 the liquid phase is highly concentrated. These analogous processes occur in the
6 MSW within an ETLF.

7
8 **Chiquita has Followed Best Management and Control Practices for Elevated**
9 **Temperature Landfills**

10
11 23. Even with aggressive actions, dissipation of heat within an ETLF
12 occurs slowly. Noticeable reductions in waste temperature often do not occur for
13 several years after heat removal has been initiated. For example, experience at the
14 Congress Landfill in Illinois has shown that a decade or more is required to
15 dissipate the heat accumulated in an ETLF. Best management practices developed
16 based on findings and recommendations from the EREF ETLF team along with
17 industry experience recognize these limitations, and focus on practical outcomes
18 that minimize impacts while removing heat.

19 24. Heat is released from an ETLF by thermal diffusion into the
20 surroundings and by convection through the removal of LFG and leachate.
21 Thermal diffusion into the surroundings is a slow heat transfer process controlled
22 by thermal conductivity of the MSW and the surroundings. Convection is a more
23 rapid heat removal process, where the heat contained within the MSW is physically
24 extracted when leachate and gas are removed. The heat capacity of liquid is much
25 greater than that of gas. Therefore, aggressive leachate removal is a best
26 management practice and is regarded as the most effective and practical heat
27 removal strategy in ETLFs.

1 25. ETLFs tend to be very wet or saturated, with high leachate levels.
2 Vertical dual-phase extraction wells are often installed in ETLFs to concurrently
3 remove leachate and gas from the waste mass. These wells remove heat that has
4 accumulated in the waste, and also drain liquid-filled pore spaces. Drainage of the
5 pores enhances the gas permeability of the MSW, resulting in more effective
6 removal of gas and management of odors. Thus, best management practices for
7 ETLFs include deployment of a dense network of dual-phase gas collection wells
8 that remove both leachate and gas. The aggressive gas removal via these wells also
9 reduces impacts by reducing odiferous emissions provided that there is an effective
10 gas treatment system.

11 26. Other best management practices that address emissions include
12 application of interim cover to control surface emissions and installation of seals
13 around gas well penetrations. Interim cover using a geomembrane has been found
14 to be very effective, including but not limited to EVOH geomembranes that have
15 very low gaseous diffusion coefficient. Perimeter misting systems can also be
16 applied to treat odiferous gases that could not be captured for treatment, and odor
17 and gas surveillance systems can be installed to detect odors and monitor the
18 concentrations of constituents released into the atmosphere.

19 27. State regulators have mandated that Chiquita Canyon Landfill
20 implement numerous mitigation measures including installing cover to contain
21 surface emissions and additional dual-phase extraction wells. These actions have
22 been undertaken, as described subsequently.

23 28. As detailed in the Declaration of Steve Cassulo, Chiquita Canyon
24 Landfill has implemented these best management practices. Since 2023, 292
25 additional vertical gas wells have been placed that have the capacity for dual-phase
26 extraction, and 170 leachate pumps have been installed in the vertical extraction
27 wells. Cassulo Decl. ¶¶ 16, 34. More pumps are planned for deployment. *Id.* ¶ 34.

Geomembrane has been installed over approximately 46 acres, with an additional geomembrane installation scheduled. *Id.* ¶ 21. A perimeter misting system has been deployed to address odoriferous emissions, odor monitoring is being conducted routinely, drone surveillance has been deployed to monitor for surface emissions, and air monitoring stations have been installed on-site and within the community. *Id.* ¶¶ 48, 51. The monitoring stations include on-location gas chromatography to provide real-time assessment of volatile organic compounds in the atmosphere. *Id.* ¶ 50. Chiquita Canyon Landfill has also installed two thermal oxidizers and one additional flare to treat the gas being extracted. *Id.* ¶¶ 19, 20.

By Following Established Guidance, Chiquita is Succeeding in Mitigating the ETLF's Effects

29. The Declarations of Steve Cassulo and Patrick Sullivan, who is an air quality and LFG systems specialist and Senior Vice President with SCS Engineers, Inc., demonstrate that these practices have had significant impact. Gas extraction at Chiquita Canyon Landfill has nearly doubled since 2023, leachate extraction has increased considerably, with more than 7 million gallons extracted in April 2025 alone, surface exceedances measured by drone have been reduced, sulfide concentrations in the atmosphere have declined steadily, and odor surveillance has shown that the frequency of objectionable odor (defined as an odor index >3+) present in the Landfill surroundings has dropped substantially. *See* Cassulo Decl. ¶ 39; Sullivan Decl. ¶¶ 20, 32, 40 and exhibits.

30. Frequency of odor complaints, while subjective, can be an indicator of the effectiveness of best management practices at ETLFs. The monthly complaint record for 2023, 2024, and 2025 is included in the Sullivan Declaration (Ex. 20)

1 and shows that odor complaints declined by more than a factor of three since the
2 best management practices were implemented.

3 31. Data collected from the temperature monitoring probes (“TMPs”) also
4 indicate that the best management practices are maintaining stable conditions
5 within the landfill. I have reviewed the temperature profiles from the TMPs, and
6 they indicate that temperatures have changed little on a year-on-year basis. Three
7 TMPs have shown larger increases in temperature year-on-year (TMP-8, TMP-11,
8 and TMP-13), but even in these TMPs, the temperatures remain modest and
9 considerably lower than observed at many other ETLFs.

10
11 **Todd Thalhamer’s Report and the County Declarants’ Conclusions are**
12 **Scientifically Unsound and Deviate from Best Practices**

13
14 32. Mr. Thalhamer has provided an assessment of the Chiquita Canyon
15 Landfill ETLF in a letter to Ms. Karen Gork of the Los Angeles County
16 Department of Public Health dated 28 March 2025. He refers to the condition at
17 Chiquita Canyon Landfill as a subsurface elevated temperature (“SET”) event. The
18 SET nomenclature is used by Mr. Thalhamer and one of his collaborators to
19 describe ETLFs, but is not a broadly accepted term in industry, regulatory, or
20 academic environments.

21 33. Mr. Thalhamer correctly recognizes that a portion of Chiquita Canyon
22 Landfill is an ETLF, with persistent elevated temperatures monitored within the
23 waste and at gas well heads, gas composition consistent with ETLF conditions, and
24 accelerated waste settlements due to elevated temperatures. This recognition is
25 consistent with my review of the data and site conditions.

26 34. My review of Mr. Thalhammer’s report indicates that he has not
27 identified the mechanisms responsible for the elevated temperatures using the

1 accepted scientific method, which includes hypothesis formulation and evaluation
2 using data and other factors. In the short period in which I have been engaged in
3 this assessment, I have not had the opportunity to evaluate and identify the
4 mechanisms responsible for elevated temperatures. ETLFs are very complex, and
5 understanding the causative mechanisms requires detailed study over a
6 considerable period. Even with a high level of effort, the causative mechanisms
7 frequently are not identified. To my knowledge, no one has drawn firm and
8 defensible conclusions regarding causation of the ETLF at Chiquita Canyon
9 Landfill.

10 35. Mr. Thalhammer has inferred that separate areas of heat generation
11 are evolving within the ETLF in response to gas collection system operations. I
12 found no scientific basis for these inferences based on the information contained in
13 his report.

14 36. Mr. Thalhamer has concluded that the “reaction area is expanding”
15 and that the “containment strategy has failed.” I found no convincing scientific
16 evidence in his report to support this conclusion. My own review of the thermal
17 data that has been collected to date, albeit over the relatively short period in which
18 I have been engaged in this assessment, suggests that the subsurface temperatures
19 that are elevated are stable.

20 37. I found no evidence that the area comprising the ETLF is expanding
21 or that a process is underway that would accelerate expansion. A local equilibrium
22 appears to exist that precludes expansion of the area comprising the ETLF.

23 38. Mr. Thalhamer has concluded that a “soil barrier” must be installed to
24 provide a “thermal block” to prevent expansion of the ETLF. No rational basis for
25 this recommendation is provided and no engineering analysis or design is used to
26 illustrate how this barrier will provide a “thermal block.” My own assessment,
27 albeit in the limited period for which I have had to study the issue, suggest that
28

1 using a soil barrier as a “thermal block” is illogical, inconsistent with
2 thermodynamic principles, and potentially could exacerbate subsurface conditions,
3 emissions, and impacts on the surrounding community. Installation of the soil
4 barrier based on the current logic would be contrary to best management practices
5 from my assessment.

6 39. The facts show that subsurface temperatures have remained relatively
7 stable, airborne emissions have diminished, and complaints have dropped
8 considerably in response to implementation of best management practices at
9 Chiquita Canyon Landfill. These facts suggest that the best management practices
10 have been effective, the ETLF is stable, and impacts on the surrounding
11 community have been reduced. The logical inference from these facts is that the
12 best management practices should continue to be implemented unless new
13 information to the contrary becomes available.

14 **Conclusion**

15
16 40. Chiquita Canyon Landfill is applying the best management and
17 control practices to address the ETLF consistent with site-specific conditions.
18 These practices have been highly successful at other ETLFs and are expected to be
19 successful at Chiquita Canyon Landfill.

20 41. The data suggest that the thermal conditions are stable, and that
21 emissions at Chiquita Canyon Landfill are being managed effectively. The best
22 management practices that are being applied are effective.

23 42. Experience from other ETLFs suggests that application of these best
24 management practices at Chiquita Canyon Landfill will continue to be successful in
25 controlling the impacts, and that the ETLF conditions will diminish over time
26 provided these best management practices are continued.

1 I declare under penalty of perjury under the laws of the State of California that the
2 foregoing is true and correct.

3 Executed on this 12th day of June 2025 in the Town of Middleton, Wisconsin.
4

5 
6

7 Craig H. Benson, PhD, PE, BCGE, BCEE, NAE
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28

Exhibit 1

CRAIG H. BENSON, PHD, PE, BCGE, BCEE, NAE

*Wisconsin Distinguished Professor Emeritus, University of Wisconsin-Madison
Dean of Engineering Emeritus, University of Virginia*

3299 Saracen Way, Verona, Wisconsin, 53593 USA

Phone: +1 (608) 444-0007

Email: chbenson@chbenson.org

EDUCATION

BSCE, Lehigh University - 1985

MSE, University of Texas at Austin – 1987 (Civil Engineering, Geotechnical/Geoenvironmental)

PhD, University of Texas at Austin – 1989 (Civil Engineering, Geotechnical/Geoenvironmental)

REGISTRATION AND APPOINTMENTS

US National Academy of Engineering, Inducted 2012

US National Academy of Inventors, Inducted 2018

American Association for Advancement of Science, Fellow, Inducted 2019

Professional Engineer, State of Wisconsin, License No. 34108-006

Board Certified Environmental Engineer, American Society of Environ. Engrs. & Scientists

Board Certified Geotechnical Engineer, Geo-Institute of the American Society of Civil Engineers

ACADEMIC LEADERSHIP APPOINTMENTS

Dean, School of Engineering, University of Virginia, Charlottesville, Virginia, July 2015 – June 2021
(Reappointed June 2020, Retired July 2021, Emeritus December 2022).

Director of Sustainability Research and Education and Co-Director of the Office of Sustainability,
University of Wisconsin, Madison, Wisconsin, 2011-2015.

Chair, Civil & Environmental Engineering, University of Wisconsin, Madison, Wisconsin, 2011-
2015.

Chair, Geological Engineering, University of Wisconsin, Madison, Wisconsin, 2007-2015.

Chair, Civil & Environmental Engineering, University of Washington, Seattle, WA, 2008-August
2009.

Director, Recycled Materials Resource Center, University of Wisconsin, Madison, Wisconsin, 2007-
2011. ①

Director, Wisconsin Geotechnics Laboratory, University of Wisconsin, Madison, Wisconsin, 2000-
2015.

Management Board, Consortium for Risk Evaluation and Stakeholder Participation, US
Department of Energy, 2009-present. ①

Associate Chair for Environmental Science and Engineering, Dept. of Civil & Environmental
Engineering, University of Wisconsin, Madison, Wisconsin, 2004-2007.

Co-Director, Consortium for Fly Ash Use in Geotechnical Engineering, University of Wisconsin-
Madison, Co-Director, 1999-2007.

PROFESSIONAL AND COMMUNITY LEADERSHIP APPOINTMENTS

Roundtable Linking Defense Basic Research to Leading Academia Research and Engineering Communities, National Academy of Engineering and US Department of Defense, 2019-2021.
Board of Trustees, Lehigh University, Bethlehem, Pennsylvania, 2018-2021.
Engineering Advisory Board, Lehigh University, Bethlehem, Pennsylvania, 2018-2020.
Sustainability Advisory Panel, ExxonMobil Corporation, Irving, Texas, 2017-2023 (disbanded).
National Academy of Engineering, Washington, DC.
Committee on Awards (2019-2022, Vice Chair 2020-2021, Chair 2021-2022)
Section 4, Chair (2021 – 2023), Vice Chair (2019 – 2021), Secretary (2016 – 2018), Nomination Committee (Chair, 2016 – 2018)
Committee on Grand Challenges and Opportunities in Environmental Engineering and Science for the 21st Century (2017-2018).
Board of Directors, Commonwealth Center for Advanced Manufacturing, Disputanta, Virginia, 2015-2021, Chair (2018-2021), Vice Chair (2016-2018), Executive Committee (2015-2021), Compensation Committee (2018-2021), Governance Committee (Chair, 2016-2018; Vice Chair, 2018-2021).
Advisory Board, Global Waste Research Institute, California Polytechnic Institute at San Louis Obispo, 2010-present.
Board of Directors, Sustain Dane, Madison, Wisconsin, 2014-2015.
Geo Institute of ASCE, Board of Governors, Board Member 2007-2014, Treasurer 2010-11, Vice President 2011-12, President, 2012-13.
Editor-in-Chief, *Journal of Geotechnical and Geoenvironmental Engineering*, 2004-06.
Executive Committee, Committee D18 on Soil & Rock, ASTM International, 2006-2013, Liaison to Geo Institute Board of Governors, 2007-2011, Vice Chair, 2011-2013.
Glacier's End Homeowners Association, Town of Middleton, WI, President, 2012-2015, Vice President, 2010 – 2012, 2020-present.
Independent Technical Review Committee for On-Site Disposal Facilities, US Department of Energy, Appointed by Asst. Secretary J. Rispoli, Chair 2007-2010 (disbanded).
Park Commission, Town of Middleton, Wisconsin, Commissioner, 2010-12.
Research Council, Environmental Research and Education Foundation, 2011-present, Vice Chair 2016-2017, Chair 2017-2018.

INDUSTRY EXPERIENCE

Dr. Benson has been extensively engaged by the environmental, energy, mining, and manufacturing industries over the last 30+ years. His recent roles include specialty engineering consultant, strategy advisor, leadership advisor, expert witness in litigation support, and corporate board director/chair. Dr. Benson's industry experience spans six continents and more than 100 companies. More information on Dr. Benson's industry experience can be provided on request.

FACULTY APPOINTMENTS

Hamilton Endowed Chair in Engineering, University of Virginia, 2015-2022 (Emeritus Dec. 2022).
Honorary Professor, Southwest Jiaotong University, Chengdu, China, 2017.
Adjunct Professor, School of Civil, Environmental, and Mining Engineering, University of Western Australia, Crawley, WA, Australia, July 2015.

Wisconsin Distinguished Professor, University of Wisconsin, Madison, Wisconsin, 2007,
Geological Engineering, Civil & Environ Engineering (Emeritus May 2021).
Affiliate Professor, Nelson Institute for Environmental Studies, University of Wisconsin, Madison,
Wisconsin, 2010-2015.
A.H. Fuller Professor, University of Washington, Seattle, WA, 2008- 2009.
Professor, University of Wisconsin, Madison, Wisconsin, 2000-2007 (joint appointment in
Geological Engineering, Civil & Environmental Engineering).
Associate Professor, University of Wisconsin, Madison, Wisconsin, 1995-2000 (joint appointment
in Geological Engineering, Civil & Environmental Engineering).
Assistant Professor, University of Wisconsin, Madison, Wisconsin, 1990-1995 (joint appointment in
Geological Engineering, Civil & Environmental Engineering).

HONORS AND AWARDS

Professional

L. David Suits Award, Committee D35 on Geosynthetics, ASTM International, 2024
Kappe Lecturer, American Academy of Environmental Engineers and Scientists, 2024 ①
Karl Terzaghi Award, Geo-Institute of the American Society of Civil Engineers, 2021
A. Ivan Johnson Outstanding Achievement Award, ASTM International, 2015
Fellow, ASTM International, 2011
Fellow, American Society of Civil Engineers, 2009
Fellow, Sigma Xi, Scientific Research Honor Society, 2017
Academy of Distinguished Alumni, University of Texas at Austin, 2009 ①
Diplomate, Geotechnical Engineering, Academy of Geo-Professionals, 2009 ①

Research

Lymon C. Reese Distinguished Lecturer, University of Texas at Austin, 2023
Best Paper Award, *Geotextiles and Geomembranes J.*, 2019
Best Paper Award, *Geosynthetics International J.*, 2019
Superior Paper Award, Waste Management Symposium, 2019, 2021, 2024
Spencer J. Buchanan Lecturer, Texas A&M University, 2014 ②
Best Paper Award, Waste Management Symposium, 2014
G. Leonards Lecturer, Purdue University, 2013
Best Paper Honorable Mention (2nd Place), *Geosynthetics International*, 2013.
Ralph B. Peck Award, American Society of Civil Engineers, 2012 ②
Outstanding Article on the Practice of Geotechnical Testing, ASTM International, 2011, 2013
Croes Medal, American Society of Civil Engineers, 1998 and 2008
Alfred P. Noble Prize, American Society of Civil Engineers, 2008
IJOG Excellent Paper Award, Intl. Assoc. Computer Methods & Advances in Geomechanics, 2008
Second Paper Award, Global Waste Management Symposium, 2008
Kellet Mid-Career Research Award, University of Wisconsin, 2005
Walter L. Huber Civil Engineering Research Award, ASCE, 2000
Casagrande Award, American Society of Civil Engineers, 1995
Middlebrooks Award, American Society of Civil Engineers, 1995, 2013
Collingwood Prize, American Society of Civil Engineers, 1994
Distinguished Young Faculty Award, U.S. Department of Energy, 1991
Presidential Young Investigator, National Science Foundation, 1991

Teaching

Polygon Outstanding Instructor Award, College of Engr., Univ. of Wisconsin, 1991, 93, 97
Outstanding Professor Award, ASCE Wisconsin Student Chapter, 1992
Top 100 Educators Award, Wisconsin Students Association, Univ. of Wisconsin, 1991

Professional Service

Honor Medal, Eurasian National University and Kazakhstan Geotechnical Society, 2013
Order of the Engineer, Geo Institute, 2011
Award of Merit, ASTM International, 2011
Richard S. Ladd Standards Development Award, Committee D18, ASTM International, 2002, 03, 04, 06, 08, 11
Special Service Award, Committee D18, ASTM International, 2007

Academics

Ford Foundation Fellowship, Univ. of Texas at Austin, 1989
John A. Focht Endowed Presidential Scholarship in Civil Engr., Univ. of Texas at Austin, 1988
Dawson Endowed Presidential Scholarship in Civil Engr., Univ. of Texas at Austin, 1986
Engineering Foundation Fellowship, University of Texas at Austin, 1985
John B. Carson Prize in Civil Engineering, Lehigh University, 1985
Phi Beta Kappa, Chi Epsilon, and Tau Beta Pi

CONGRESSIONAL TESTIMONY & DISCUSSION

Invited Testimony on Proposed USEPA Regulations Related to Coal Combustion Products; House Small Business Committee, Congressman H. Shuler, Chair (D-NC), 22 July 2010. 
Invited Discussion on Environmental Regulation and Sustainable Materials Management; Senators for Environmental Policy and Sustainability, 29-30 May 2012.

LEADERSHIP DEVELOPMENT

Academic Leadership Program, Committee on Institutional Cooperation, Big10 Academic Alliance, 2010 – 2011. 
Manager's Boot Camp, Center for Executive Education, Haas School of Business, University of California-Berkeley
Negotiations and Influence, Center for Executive Education, Haas School of Business, University of California-Berkeley
Philanthropy Fundamentals: Developing and Stewarding Donors, UW Foundation

UNIVERSITY SERVICE

Academic Council, UW Dept. of Civil and Environmental Engineering (1994-99, Chair 1997-99)
Academic Planning Council, UW Nelson Institute for Environmental Studies (2012-2016)
Ad Hoc Committee on Fossil Fuel Use and Climate Change, UW (2013-2014)
Admissions Chair, UW Geotechnical Engineering Program (1990-2006)
Becker Award Committee, UW Civil and Environmental Engineering (Chair 2002-04)
Bicentennial Commission, Future of Public Education Committee, UVA (2017-2022)
Bollinger Academic Staff Award Committee, UW (2010-11, Chair)
Byron Bird Award Committee, UW College of Engineering (1995)
Chancellor's Campus Budget Model Committee, UW (2013-2014)

Civil and Environmental Engineering Strategic Hiring Committee, UW (2010-12, Chair 2010)
Civil and Environmental Engineering Merit Committee, UW (1998, 2002, 2004-2006, Chair 2002)
Classroom Space Utilization Committee, Co-Chair, UW (2014)
Climate Change Solutions Committee, UW (2013-2015, Chair)
College of Engineering Search Committee for Executive Associate Dean, UW (Chair, 2014)
College of Engineering Leadership Council, UW (2013-2015)
College of Engineering Promotion and Tenure Committee, UW (2014-2015)
College of Engineering Search Committee for Associate Dean for Advancement, UW (2013)
College of Engineering Search Committee for Assistant Dean for Facilities, UW (2013)
College of Engineering Academic Planning and Curriculum Committee, UW (1996-99)
College of Engineering Curriculum Committee, UW (1997-99, 2002-04)
College of Engineering Diversity Committee, UW (2002-04)
Conflict of Interest Oversight Committee, University of Wisconsin (2000-02)
Governance Committee, UW Nelson Institute for Environmental Studies (2012-present).
Graduate Committee, UW Geological Engineering (1999-2006, Chair 1999-2001, 2003-2006)
Master Planning Committee, Deans' Council Representative, University of Virginia (2018-19)
Scholarship Committee, UW Dept. of Civil and Environmental Engineering (1998-2002)
Search Committee for Vice President for Research, UVA (2015-2017)
Search Committee for Assoc. Vice Chancellor for Facilities Planning & Mgmt., UW (Chair, 2012)
Search Committees for UW Geological Engineering (Chair, 1997-98, 2003-04)
Tau Beta Pi, Virginia Alpha Chapter, Advisor, 2019 – 2022.
Undergraduate Committee, UW Geological Engineering (Chair, 2002-2008)
University of Wisconsin Information Technology Committee (2010-12)
University of Wisconsin Honors Committee (2010-2011)

PROFESSIONAL SERVICE & AFFILIATIONS

National Academy of Engineering, 2012- present.
Science Advisory Board, Environmental Engineering Committee, US Environmental Protection Agency, 2015-2018 (committee disbanded).
Steering Committee, Performance and Risk Assessment Community of Practice, US Department of Energy, 2013-2022, co-Chair 2024-present.
Research Council, Environmental Research and Education Foundation, 2013-present, Vice Chair 2015-2016, Chair, 2017-2018.
External Advisory Board, School of Engineering, University of Connecticut (2019)
American Association for the Advancement of Science
Colorado School of Mines
 External Advisory Board, College of Earth Resource Sciences and Engineering (2016)
 External Advisory Board, Dept. of Geology and Geological Engineering (2015, 2018)
 External Advisory Board, College of Engineering (2012)
External Advisory Board, Department of Civil and Environmental Engineering, Vanderbilt University (2015-2022)
External Advisory Board, Engineering School of Sustainable Infrastructure & Environment, University of Florida (2011)
ASTM International
 D18 Executive Committee (2006-13, Vice Chair 2011-13)
 D18.04 - Hydrologic Properties of Soil & Rock (1991-present, Chair 1996-2006)
 D18.14 – Sustainable Geotechnical Construction (founding member, 2008-present)

D18.19 - Frozen Soil & Rock (1992-present)
Geo-Institute of the American Society of Civil Engineers (Fellow ASCE)
Board of Governors (Treasurer 2010-11, V. President, 2011-12, President 2012-13)
Org. Committee, Geo-Chicago 2016: Sustainability, Energy, & Geoenviron. Conf. (2014-16)
Awards Committee (Chair, 1999-01, Member 2023-current)
Editor-in-Chief, *JGGE*, 2004-06, Editor *JGGE*, 1996-99, Ombudsman *JGGE*, 2023-present.
Geoenvironmental Engineering Committee (1990-present, chair 1996-99)
Geo-Strata Magazine Task Force (1997-99)
Technical Publications Committee (1993-99, 2004-2006, BoG Liaison 2010-2013)
TPC Subcommittee on Policies for Specialty Conferences (1997-99)
American Geophysical Union
British Geotechnical Association
Canadian Geotechnical Society
International Geosynthetics Society
National Ground Water Association
North American Geosynthetics Society
Soil Science Society of America

PATENTS

Apparatus and Method for Testing the Hydraulic Conductivity of Geologic Materials, United States Patent No. 6,178,808.
Pressure Plate Extractor, United States Patent No. 6,718,835.
Bentonite Collars for Wellbore Casings, United States Patent No. 9,080,419.

LIVE INTERVIEWS, KEYNOTE AND SPECIAL LECTURES

Performance of Final Covers for Waste Containment Systems: Lessons Learned From the Field, Kappe Lecture, American Academy of Environmental Engineers and Scientists, Drexel University, 2 April 2025.
Elevated Temperature Landfills (ETLFs): Causation, Impacts, and Best Management Practices Learned from the Field, Kappe Lecture, University of Miami, 28 March 2025.
Does Harvesting Coal Ash for Use as Cementitious Material Promote Sustainability? Kappe Lecture, University of Nebraska-Lincoln, 20 February 2025.
Does Harvesting Coal Ash for Use as Cementitious Material Promote Sustainability? Kappe Lecture, Missouri University of Science and Technology, 12 February 2025.
Elevated Temperature Landfills (ETLFs): Causation, Impacts, and Best Management Practices Learned from the Field, Kappe Lecture, St. Louis University, 11 February 2025.
Elevated Temperature Landfills (ETLFs): Causation, Impacts, and Best Management Practices Learned from the Field, College of Engineering and Computer Science (CECE) Distinguished Lecturer Series, University of Central Florida, 5 December 2024.
Performance of Final Covers for Waste Containment Systems: Lessons Learned From the Field, Kappe Lecture, American Academy of Environmental Engineers and Scientists, University of New Mexico, 13 November 2024.
Does Harvesting Coal Ash for Use as Cementitious Material Promote Sustainability? George Mason Univ., Dept. of Civil Engineering Distinguished Speaker Lecture Series, 24 October 2024. ↻

Elevated Temperature Landfills (ETLFs): Causation, Impacts, and Best Management Practices Learned from the Field, Kappe Lecture, American Academy of Environmental Engineers and Scientists. LA County Sanitation District, 25 June 2024, [PDF]; Clemson University, 10 October 2024, [PDF].

Performance of Waste Containment Systems for Long-Lived Waste Forms: Lessons Learned From the Field, Lymon C. Reese Distinguished Lecture, University of Texas at Austin, Austin, Texas, 14 April 2023.

Lessons Learned for the Practicing Engineer: How and When Geosynthetic Clay Liners are Effective for Containment, Keynote Lecture, GeoANZ 1 Advances in Geosynthetics, Brisbane, Queensland, Australia, 9 June 2022.

In-Service Condition of Radon Barriers over Uranium Mill Tailings Disposal Facilities in the United States, Craig H. Benson, National Council on Radiation Protection and Measurements 2022, Bethesda, Maryland, USA, 29 March 2022 [PDF].

Stress-Induced Porewater Pressures in the Vadose Zone Beneath a Composite-Lined Landfill, 3rd International Symposium on Coupled Phenomena in Environmental, Kyoto, Japan, October 2021. [PDF].

Tackling Geoenvironmental Problems in the Unsaturated Zone: Principles and Practice, Keynote Lecture, 12th Asian Regional Conference of the International Association of Engineering Geologists, Jeju Island, Korea, September 2019.

Factors Affecting the Long-term Hydraulic Conductivity of Geosynthetic Clay Liners used in Liners, Workshop on Advances In Characterization of Hydraulic Barrier Performance of GCLs, ASTM International, Denver, Colorado, June 2019.

Using Life Cycle Analysis to Evaluate Options to Promote Infrastructure Sustainability, Sustainability in Urban Planning and Infrastructure, Celfi Sustentabilidad Y Desarrollo, Universidad Nacional de Córdoba, Córdoba, Argentina, May 2019.

Sustainability in Geoengineering: A New Paradigm for Engineering with Earthen Materials, 8th International Congress on Environmental Geotechnics, Hangzhou China, November 2018.

Water Balance Covers for Waste Containment: Engineering with Unsaturated Soils from Theory to Practice, Dr. Arthur T. Corey Distinguished Lecture Series, Colorado State University, Fort Collins, Colorado, October 2018.

Sustainability: Compelling Value Proposition for Engineers, Southwest Jiaotong University, Chengdu, China, November 2017.

Principles of Unsaturated Soil Behavior to Design Water Balance Covers for Waste Containment, Pan-Am UNSAT 2017, Dallas, Texas, November 2017.

Infusing Sustainability into Geotechnics: Opportunity for a New Value Proposition, Geo-Chicago 2016 - Sustainability, Energy, & the Geoenvironment, ASCE Geo-Institute, Chicago, August 2016.

Earthen & Geosynthetic Covers for Mine Waste Containment – Lessons Learned from Case Histories, Symposium on Caps and Covers for Mine Waste, Society for Mining Engineers, Pocatello, Idaho, April 2016.

Civil & Environmental Engineering: Creating a Compelling Value Proposition for the Future, Lehigh University, 150th Anniversary Reunion, April 2016.

Engineering Bentonite-Polymer Composite Materials for Extreme Environmental Applications, T.H. Wu Distinguished Lecture, Ohio State University, March 2016.

Are We Designing for Sustainability? Using Life Cycle Analysis to Assess Sustainability Accomplishment, Higley Endowed Lecture, Case Western Reserve University, April 2015.

Next Generation GCLs with Polymer-Bentonites for Extreme Environmental Applications, Keynote Lecture, Global Waste Research Institute, San Luis Obispo, CA, February 2015.

Landfill Covers: Water Balance, Unsaturated Soils, and the Pathway from Theory to Practice, Spencer J. Buchanan Lecture, Texas A&M University, November 2014. ☐

Polymer-Modified Bentonites for Extreme Environmental Applications, Keynote Lecture, 7th Intl. Conference on Environmental Geotechnics, Melbourne, Australia, November 2014.

Strategies for Long-Term Monitoring and Stewardship, Best Practices for Risk-Informed Remedy Selection, Closure, and Post-Closure Control of Contaminated Sites, National Academy of Sciences, Washington, DC, January 2014.

Sustainable Closure of Waste Containment Systems Using Water Balance Covers: Lessons Learned from a Nationwide Field Experiment, Distinguished Lecture Series, University of Texas at Austin, November 2013.

Organoclays: Barrier Media for Managing Groundwater Flow and Transport At NAPL-Sites, University of Michigan, November 2013.

Solid Waste in the USA: Moving from Disposal to Sustainable Materials and Energy Management, University of California, Los Angeles, November 2013.

Organoclays: Novel Barrier Media for Managing Groundwater Flow and Transport at NAPL-Contaminated Sites, 11th G. A. Leonards Lecture, Purdue Geotechnical Society, April 2013.

Sustainability -- Opportunity for Innovation in the Solid Waste Industry, Engineering Society of Detroit, Keynote, April 2013.

Earthen and Geosynthetic Final Covers for Mine Waste Containment, Geosynthetics in Mining, Pocatello, ID, February 2013.

The Solid Waste Industry as a Sustainability Industry: Moving from Disposal to Materials and Energy Management, Keynote Lecture, Global Waste Management Symposium, Phoenix, AZ, October 2012.

Geosynthetic Clay Liners (GCLs): Lessons Learned from Full-Scale Applications, 2012 Ralph M. Peck Lecture, ASCE Geo Institute, Oakland, CA, March 2012. ☐

Designing Water Balance Covers for Sustainable Waste Containment: Transitioning State-of-the-Art to State-of-the-Practice, GeoCongress 2012, ASCE Geo Institute, Oakland, CA, March 2012.

Unsaturated Geotechnics: Transitioning from State-of-the-Art to State-of-the Practice, 5th Asia-Pacific Conference on Unsaturated Soils, Bangkok, Thailand, February 2012.

Recycled Materials, Infrastructure, and Sustainability, Waste Management Association of Australia National Conference 2011, Adelaide, S. Australia, August 2011.

Novel Developments in Geosynthetic Clay Liner Technology, Innovations in Geosynthetic Materials Used in Environment and Infrastructure Symposium, Ministry of Environment and Ministry of Interior, Almaty, Republic of Kazakhstan, February 2011.

Role of Recycled Materials in Sustainable Infrastructure, Weston Roundtable Lecture, Nelson Institute for Environmental Studies, University of Wisconsin-Madison, January 2011.

Sustainable Bioreactor Landfills: North American State-of-the-Practice and State-of-the-Art in North America, Keynote Lecture, Sixth Asian Pacific International Landfill Symposium, Seoul, Korea, October 2010.

Physical and Chemical Processes Altering Geosynthetic Clay Liners In Situ, Distinguished Lecture Series, Department of Geology, Korea University, Seoul, Korea, October 2010.

Hydraulic & Chemical Properties of Geosynthetic Clay Liners Exhumed from Landfill Final Covers: Lessons Learned from a Decade of Research, Keynote Lecture, 3rd International Symposium on Geosynthetic Clay Liners, International Geosynthetics Society and SKZ – ConSem GmbH, Wurzburg, Germany, September 2010.

Evaluating our Predictive Capabilities in Geoenvironmental Engineering, Distinguished Lecture Series, Dept. of Civil and Materials Engineering, University of Illinois-Chicago, April 2010.

- Prediction in Geoenvironmental Engineering: How Good are our Models?*, Keynote Lecture, GeoFlorida 2010, Advances in Analysis, Design, and Modeling, ASCE Geo Institute, West Palm Beach, FL, February 2010.
- Final Covers for Waste Containment: Lessons Learned from a Nationwide Field Experiment*, Sowers State-of-the-Art Lecture, 12th Annual George F. Sowers Symposium, Georgia Institute of Technology, Atlanta, Georgia, May 2009.
- Chemical Alterations and Their Impact on the Hydrologic Properties of Bentonite*, Monash University, Melbourne, Victoria, Australia, December 2008.
- Hydrology and Settlement in Bioreactor Landfills*, Cutting Edge Technological Advances in Design and Operation, Reducing Leachate Quantity, Spatial Needs, and Costs, and Accelerating Landfill Gas Recovery Rates, World Bank, Washington, DC, November 2007.
- Modeling Unsaturated Flow and Atmospheric Interactions*, Keynote Speaker, Second International Conference on Mechanics of Unsaturated Soils, Weimar, Germany, March 2007.
- Geosynthetic Clay Liners for Waste Containment: Panacea or Future Problem?*, Geosynthetic Research Institute, Drexel University, Philadelphia, November 2005.
- Effects of Heterogeneity on Mineral Fouling of Permeable Reactive Barriers*, 2nd International Conference on Reactive Barriers, Belfast, Northern Ireland, March 2004.
- Lessons Learned from North American Failures*, Keynote Lecture, Fifth International Conference on Environmental Geotechnics, ISSMGE, Rio de Janeiro, Brazil, August 2002.
- Waste Containment Systems: Strategies and Performance*, Keynote Lecture, GeoEnvironment 2002, Australian-New Zealand Geomechanics Society, Newcastle, NSW, Australia, Nov. 2001
- Engineered Barriers*, Keynote Lecture, National Academy of Sciences, Washington, DC, July 2001.
- Solid Waste Containment Systems*, Keynote Lecture (with M. Manassero), GeoEng2000, Melbourne, Australia, November 2000.
- Liners and Covers for Waste Containment*, Keynote Speaker, Fourth Kansai International Geotechnical Forum, Creation of a New Geo-Environment, Japanese Geotechnical Society, Kyoto, Japan, June 2000
- Environmental Geotechnics in the New Millennium*, Keynote Speaker, Geotechnics for Developing Africa, African Geotechnical Society, Durban, South Africa, March 1999.
- Final Covers for Waste Containment Systems: A North American Perspective*, Keynote Speaker, XVII Conference of Geotechnics of Torino, Control and Management of Subsoil Pollutants, Italian Geotechnical Society, Torino, Italy, January 1999.

WEBINARS, SHORTCOURSES, AND VIDEO CLIPS

- Black Goo: What is This Stuff and What Can We Do About It?*, Engineering Science and Wastewater Technology Program, Waste Management Inc., 15 May 2025. 
- Black Goo: What is This Stuff and What Can We Do About It?*, Kappe Lecture Webinar, American Academy of Environmental Engineers and Scientists, 20 March 2025. 
- Principles of Soil Physics and Vadose Zone Hydrology Applied to Practice*, Electric Power Research Institute, 2024. 1 – What is the Vadose Zone?  ; 2 – Quantifying Water Movement in the Vadose Zone  ; 3 – Simulating Variably Saturated Flow for Practical Problems  ; 4 – Measuring Hydraulic Properties in the Laboratory  ; 5 – Measuring Hydraulic Properties in the Field  
- Landfill Design for Coal Combustion Products*, Electric Power Research Institute, 2024. 0–Introduction and course content  ; 1–Basics of CCP Landfills: Foundational Principles and Concepts  ; 2–Geosynthetics in CCP Landfill Design  ; 3A–Principles of Compacted Soil Liners  ; 3B–Construction Considerations for Compacted Clay Liners  ; 4–Geosynthetic Clay Liners  ; 5–

Leachate Collection Systems [PDF]; 6–*Final Covers for Waste Containment Facilities* [PDF]; 7–*Performance Based Design: Making the Case for Alternative Liners* [PDF]; 8–*Slope Stability for Landfills* [PDF].

Water Balance Covers: Principles, Performance Prediction, and Performance, Iowa Dept. of Natural Resources, 16 July 2024. Entire course [PDF]; Purpose and Scope [PDF]; Introduction to Water Balance Covers [PDF]; Water Balance Cover Modeling [PDF]; Monitoring and Case Histories [PDF].

Black Goo II - Understanding and Treating Black Goo in Landfills, SCS Learning Center, 23 April 2023.

Science Session - Black Goo: The Unseen Challenge in Modern Waste Management, Environmental Research and Education Foundation, 16 August 2023. [PDF]

Identifying and Managing Elevated Temperature Landfills, SCS Learning Center, 27 July 2023. [PDF]

Bentonite-Polymer Composite Geosynthetic Clay Liners for Heap Leach Liners, 5th International Conference on Heap Leach Mining Solutions 2022, Sparks, Nevada, 17 October 2022. [PDF] [starts at 36:34].

Lessons-Learned in the Design and Construction of Capping Systems Used in the Closure of Near Surface Disposal Facilities, International Atomic Energy Agency’s International Low Level Waste Disposal Network (DISPONET) Meeting on Lessons Learned from the Disposal of Low-Level Waste, Bulgaria, 4 October 2022. [PDF]

Enhancing Armored Final Covers for Radioactive Waste Disposal Facilities Through Naturalization, Performance and Risk Assessment Community of Practice, US Dept. of Energy, Washington, DC, 17 August 2022. [PDF]

Plastic Recycling and Upcycling as an Element of Sustainable Waste Management, USAID, Washington, DC, 12 August 2022.

In-Service Condition of Radon Barriers over Uranium Mill Tailings Disposal Facilities in the United States, National Council on Radiation Protection and Measurements 2022, Bethesda, Maryland, 29 March 2022. [PDF]

PFAS Containment by Modern Liner Systems: the Good News – and the Bad!, Craig H. Benson and R. Kerry Rowe, International Geosynthetics Society-North America, 13 January 2022. [PDF]

In-Service Condition of Final Covers Over Historic Uranium Mill Tailings Disposal Facilities, International Webinar Series - Geoenvironmental Engineering: Polluted Land, Waste Management & Sustainability/Resiliency, University of Illinois-Chicago, 15 October 2021. [PDF]

A Career in Environmental Engineering with Geosynthetics, Simak’s Geosynthetics Podcast, 16 March 2021. [PDF]

Bentonite-Polymer Composite Geosynthetic Clay Liners for Containment of Highly Aggressive Leachates, International Webinar Series - Geoenvironmental Engineering: Polluted Land, Waste Management & Sustainability/Resiliency, University of Illinois-Chicago, 29 April 2021. [PDF]

Performance-Based Landfill Liner Design, 21st National Course on Solid Waste Landfill Design, University of Wisconsin Madison, 23 March 2021. [PDF]

Geosynthetic Clay Liners, 21st National Course on Solid Waste Landfill Design, University of Wisconsin Madison, 23 March 2021. [PDF]

Final Covers for Waste Containment Facilities, 21st National Course on Solid Waste Landfill Design, University of Wisconsin Madison, 23 March 2021. [PDF]

Elevated Temperature Landfills, 21st National Course on Solid Waste Landfill Design, University of Wisconsin Madison, 24 March 2021. [PDF]

Stability of Final Covers, 21st National Course on Solid Waste Landfill Design, University of Wisconsin Madison, 23 March 2021. [PDF]

In-Service Condition of Final Covers Over Historic Uranium Mill Tailings Disposal Facilities, Australasian Chapter of the International Geosynthetics Society, 24 February 2021. [PDF]

Geosynthetics in Landfills: Accomplishments and Future Directions, GeoAmericas 2020, 4th Pan American Conference on Geosynthetics, 31 October 2020. 

Fundamentals of GCLs as Exceptional Hydraulic Barriers, Webinar 1 of 4, GCL Webinar Series, 12 August 2020. 

Bentonite-Polymer Composite GCLs for Aggressive Conditions, Webinar 2 of 4, GCL Webinar Series, 10 November 2020. 

Evaluating Chemical Compatibility of Geosynthetic Clay Liners (GCLs), Webinar 3 of 4, GCL Webinar Series, 16 February 2021. 

Practical Lessons Learned from Geosynthetic Clay Liner (GCL) Case Histories, Webinar 4 of 4, GCL Webinar Series, 4 August 2021. 

GCL Tech Talk: The Science Behind the Magic of Bentonite, 7 April 2020. 

GCL Tech Talk: Hydraulic Conductivity of Engineered Bentonite-Polymer Composite (BPC) Materials, 7 April 2020. 

Engineering in Real Time: Accelerating the Innovation Cycle, with Jennifer Pulley and Innovation Now, National Public Radio, 13 July 2018. 

The Internet of All Things: LinkLab Collaborative Environment, with Jennifer Pulley and Innovation Now, National Public Radio, 3 July 2018. 

Coal Combustion Residual Containment, Craig H. Benson and John T. Allen, *Geosynthetica*, 15 July 2016. 

Frac-Sand Mining Roundtable, with Joy Cardin on the Joy Cardin Show, Wisconsin Public Radio, 11 May 2015. 

Coal Ash = Environmental Win (when you recycle it), with Dan Weissmann and Marketplace, National Public Radio, 28 April 2014. 

PUBLICATIONS

Refereed Journal Articles: Environmental Containment Systems

Abichou, T., Powelson, D., Aitchison, E., Benson, C., and Albright, W. (2005), Water Balances in Vegetated Lysimeters at a Georgia Landfill, *Soil and Crop Society of Florida Proc.*, 64, 1-8. 

Abichou, T., Benson, C., and Edil, T. (2004), Network Model for Hydraulic Conductivity of Sand-Bentonite Mixtures, *Canadian Geotech. J.*, 41(4), 698-712. 

Abichou, T., Benson, C., and Edil, T. (2002), Micro-Structure and Hydraulic Conductivity of Simulated Sand-Bentonite Mixtures, *Clays and Clay Minerals*, 50(5), 537-545. 

Abichou, T., Benson, C., and Edil, T. (2002), Foundry Green Sands as Hydraulic Barriers: Field Study, *J. Geotech. Geoenvironmental Eng.*, 128(3), 206-215. 

Abichou, T., Benson, C., and Edil, T. (2000), Foundry Green Sands as Hydraulic Barriers: Laboratory Study, *J. Geotech. Geoenvironmental Eng.*, 126(12), 1174-1183. 

Abu-Hassanein, Z., and Benson, C., and Blotz, L. (1996), Electrical Resistivity of Compacted Clays, *J. Geotech. Eng.*, 122(5), 397-407. 

Abu-Hassanein, Z. and Benson, C., Wang, X., and Blotz, L. (1995), Determining Bentonite Content in Soil-Bentonite Mixtures Using Electrical Conductivity, *Geotech. Testing J.*, 19(1), 51-57. 

Albrecht, B. and Benson, C. (2002), Predicting Airflow Rates in the Coarse Layer of Passive Dry Barriers, *J. Geotech. Geoenvironmental Eng.*, 128(4), 338-346. 

Albrecht, B. and Benson, C. (2001), Effect of Desiccation on Compacted Natural Clays, *J. Geotech. Geoenvironmental Eng.*, 127(1), 67-76. 

Albright, W., Benson, C., and Apiwantragoon, P. (2013), Field Hydrology of Landfill Final Covers with Composite Barrier Layers, *J. Geotech. Geoenvironmental Eng.*, 139(1), 1-12. 

- Albright, W., Benson, C., Gee, G., Abichou, T., Tyler, S., Rock, S. (2006), Field Performance of Three Compacted Clay Landfill Covers, *Vadose Zone J.*, 5(6), 1157-1171. ↗
- Albright, W., Benson, C., Gee, G., Abichou, T., Tyler, S., Rock, S. (2006), Field Performance of a Compacted Clay Landfill Final Cover at A Humid Site, *J. Geotech. Geoenvironmental Eng.*, 132(11), 1393-1403. ↗
- Albright, W., Benson, C., Gee, G., Roesler, A., Abichou, T., Apiwantragoon, P., Lyles, B., and Rock, S. (2004), Field Water Balance of Landfill Final Covers. *J. Environ. Quality*, 33(6), 2317-2332. ↗
- Akpinar, M. and Benson, C. (2005), Effect of Temperature on Shear Strength of Two Geomembrane-Geotextile Interfaces, *Geotextiles and Geomembranes*, 23, 443-453. ↗
- Apiwantragoon, P., Benson, C., and Albright, W. (2014), Field Hydrology of Water Balance Covers for Waste Containment, *J. Geotech. Geoenvironmental Eng.*, 04014101. ↗
- Bareither, C., Foley, J., and Benson, C. (2015), Using Surrogate Meteorological Data to Predict the Hydrology of a Water Balance Cover, *J. Geotech. Geoenvironmental Eng.*, 04015092. ↗
- Bareither, C., Benson, C., Barlaz, M., Edil, T., and Tolaymat, T. (2010), Performance of North American Bioreactor Landfills: I. Leachate Hydrology and Waste Settlement, *J. Environmental Engineering*, 136(8), 824-838. ↗
- Bareither, C., Benson, C., and Edil, T. (2012), Effects of Waste Composition and Decomposition on the Shear Strength of Municipal Solid Waste, *J. Geotech. Geoenviron. Eng.*, 138(10), 1161-1174. ↗
- Bareither, C., Benson, C., Cook, E., and Scalia, J. (2020), Hydraulic and Mechanical Behavior of Municipal Solid Waste and High-Moisture Waste Mixtures, *Waste Management*, 105, 540-549. ↗
- Barlaz, M., Bareither, Hossain, A., Saquing, J., Mezzari, I., Benson, C., and Tolaymat, T. (2010), Performance of North American Bioreactor Landfills: II. Chemical and Biological Characteristics, *J. Environmental Engineering*, 136(8), 838-853. ↗
- Benson, C., Albright, W., Waugh, W., Apiwantragoon, P., Tigar, A., and Holbrook, D. (2024), Field Hydrology of Armored Earthen Final Covers With and Without Vegetation, *J. Geotech. Geoenvironmental Eng.*, 150(1), 04023125. **(Editor's Choice)** ↗
- Benson, C., Chen, J., Likos, W., and Edil, T. (2018), Hydraulic Conductivity of Compacted Soil Liners Permeated with Coal Combustion Product Leachates, *J. Geotech. Geoenvironmental Eng.*, 144(4), 04018011. **(Editor's Choice)** ↗
- Benson, C. and Yesiller, N. (2016), Variability of Saturated Hydraulic Conductivity Measurements Made Using a Flexible-Wall Permeameter, *Geotech. Testing J.*, doi: 10.1520/GTJ20150138, 39(3), 476-491. ↗
- Benson, C., Edil, T., and Wang, X. (2012), Evaluation of a Final Cover Slide at a Landfill with Recirculating Leachate, *J. Geotextiles and Geomembranes*, 35, 100-106. ↗
- Benson, C., Oren, A., Gates, W. (2010), Hydraulic Conductivity of Two Geosynthetic Clay Liners Permeated with a Hyperalkaline Solution, *J. Geotextiles and Geomembranes*, 28(2), 206-218. ↗
- Benson, C., Kucukkirca, I., and Scalia, J. (2010), Properties of Geosynthetics Exhumed from the Final Cover at a Solid Waste Landfill, *J. Geotextiles and Geomembranes*, 28, 536-546. ↗
- Benson, C. and Meer, S. (2009), Relative Abundance of Monovalent and Divalent Cations and the Impact of Desiccation on Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 135(3), 349-358. ↗
- Benson, C., Thorstad, P., Jo, H., and Rock, S. (2007), Hydraulic Performance of Geosynthetic Clay Liners in a Landfill Final Cover, *J. Geotech. Geoenvironmental Eng.*, 133(7), 814-827. ↗
- Benson, C., Barlaz, M., Lane, D., and Rawe, J. (2007), Practice Review of Five Bioreactor/Recirculation Landfills, *Waste Management*, 27(1), 13-29. ↗

- Benson, C., Sawangsuriya, A., Trzebiatowski, B., and Albright, W. (2007), Post-Construction Changes in the Hydraulic Properties of Water Balance Cover Soils, *J. Geotech. Geoenvironmental Eng.*, 133(4), 349-359. ☞
- Benson, C., Abichou, T., and Jo, H. (2004), Forensic Analysis of Excessive Leakage from Lagoons Lined with a Composite GCL, *Geosynthetics Intl.*, 11(3), 242-252. ☞
- Benson, C. (2001), Waste Containment: Strategies and Performance, *Australian Geomechanics*, 36(4), 1-25. ☞
- Benson, C., Abichou, T., Albright, W., Gee, G., and Roesler, A. (2001), Field Evaluation of Alternative Earthen Final Covers, *Intl. J. Phytoremediation*, 3(1), 1-21. ☞
- Benson, C., Daniel, D., and Boutwell, G. (1999), Field Performance of Compacted Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 125(5), 390-403. ☞
- Benson, C., Gunter, J., Boutwell, G., Trautwein, S., and Berzanskis, P. (1997), Comparison of Four Methods to Assess Hydraulic Conductivity, *J. Geotech. Geoenvironmental Eng.*, 123(10), 929-937. ☞
- Benson, C., Olson, M., and Bergstrom, W. (1996), Temperatures of Insulated Landfill Liner, *J. Transportation Research Board*, 1534, 24-31. ☞
- Benson, C. and Trast, J. (1995), Hydraulic Conductivity of Thirteen Compacted Clays, *Clays and Clay Minerals*, 43(6), 669-681. ☞
- Benson, C., Chamberlain, E., Erickson, A., and Wang, X. (1995), Assessing Frost Damage in Compacted Clay Liners, *Geotech. Testing J.*, 18(3), 324-333. ☞
- Benson, C., Abichou, T., Olson, M., and Bosscher, P. (1995), Winter Effects on the Hydraulic Conductivity of Compacted Clay, *J. Geotech. Eng.*, 121(1), 69-79. ☞
- Benson, C., Zhai, H., and Wang, X. (1994), Estimating Hydraulic Conductivity of Compacted Clay Liners, *J. Geotech. Eng.*, 120(2), 366-387. ☞
- Benson, C. and Daniel, D. (1994), Minimum Thickness of Compacted Soil Liners: I-Stochastic Models, *J. Geotech. Eng.*, 120(1), 129-152. ☞
- Benson, C. and Daniel, D. (1994), Minimum Thickness of Compacted Soil Liners: II-Analysis and Case Histories, *J. Geotech. Eng.*, 120(1), 153-172. ☞
- Benson, C., Bosscher, P., Lane, D., and Pliska, R. (1994), Monitoring System for Hydrologic Evaluation of Landfill Final Covers, *Geotech. Testing J.*, 17(2), 138-149. ☞
- Benson, C., Zhai, H. and Rashad, S. (1994), Statistical Sample Size for Construction of Soil Liners, *J. Geotech. Eng.*, 120(10), 1704-1724. ☞
- Benson, C. and Othman, M. (1993), Hydraulic and Mechanical Characteristics of Compacted Municipal Solid Waste Compost, *Waste Management and Research*, 11(1), 127-142. ☞
- Benson, C. (1993), Probability Distributions for Hydraulic Conductivity of Compacted Soil Liners, *J. Geotech. Eng.*, 119(3), 471-486. ☞
- Benson, C. and Othman, M. (1993), Hydraulic Conductivity of Compacted Clay Frozen and Thawed In Situ, *J. Geotech. Eng.*, 119(2), 276-294. ☞
- Benson, C. and Daniel, D. (1990), Influence of Clods on Hydraulic Conductivity of Compacted Clay, *J. Geotech. Eng.*, 116(8), 1231-1248. ☞
- Blotz, L., Benson, C., and Boutwell, G. (1998), Estimating Optimum Water Content and Maximum Dry Unit Weight for Compacted Clays, *J. Geotech. Geoenvironmental Eng.*, 124(9), 907-912. ☞
- Bohnhoff, G., Ogorzalek, A., Benson, C., Shackelford, C., and Apiwantragoon, P. (2009), Field Data and Water-Balance Predictions for a Monolithic Cover in a Semiarid Climate, *J. Geotech. Geoenvironmental Eng.*, 135(3), 333-348. ☞
- Bradshaw, S. and Benson, C. (2014), Effect of Municipal Solid Waste Leachate on Hydraulic Conductivity and Exchange Complex of Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 04013038. ☞

- Bradshaw, S., Benson, C., and Scalia, J. (2013), Cation Exchange During Subgrade Hydration and Effect on Hydraulic Conductivity of Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 139(4), 526-538. ↗
- Bradshaw, S., Benson, C., and Rauen, T. (2015), Hydraulic Conductivity of Geosynthetic Clay Liners to Recirculated Municipal Solid Waste Leachates, *J. Geotech. Geoenvironmental Eng.*, 04015074. ↗
- Chen, J., Benson, C., Edil, T., and Likos, W. (2018), Hydraulic Conductivity of Geosynthetic Clay Liners with Sodium Bentonite to Coal Combustion Product Leachates, *J. Geotech. Geoenvironmental Eng.*, 144(3), 0401800. ↗
- Chen, J., Gustitus, S., Lin, H. and Benson, C. (2024), Shear Strength of Bentonite-Polymer Composite Geosynthetic Clay Liners and Geomembranes, *Environmental Geotechnics*, 11(2), 102-111, <https://doi.org/10.1680/jenge.22.00071>. ↗
- Chen, J., Salihoglu, S., Benson, C., Likos, W., and Edil, T. (2019), Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners Permeated with Coal Combustion Product Leachates, *J. Geotech. Geoenvironmental Eng.*, 145(9), 04019038. ↗
- Daniel, D. and Benson, C. (1990), Water Content-Density Criteria for Compacted Soil Liners, *J. Geotech. Eng.*, 116(12), 1811-1830. ↗
- Eun, J., Tinjum, J., Benson, C., and Edil, T. (2017), Equivalent Transport Parameters for Volatile Organic Compounds in Coextruded Geomembrane Containing Ethylene-Vinyl Alcohol, *J. Geotech. Geoenvironmental Eng.*, 144(7), 04018040. ↗
- Eun, J., Tinjum, J., Benson, C., and Edil, T. (2017), Comparison of Volatile Organic Compound (VOC) Transport between Composite Liners with HDPE and Ethylene-Vinyl Alcohol (EVOH) Co-Extruded Geomembranes, *J. Geotech. Geoenvironmental Eng.*, 04017010. ↗
- Eun, J., Tinjum, J., Benson, C., and Edil, T. (2018), Methane Transport Through Simulated Landfill Covers with a PE Geofilm or Ethylene-Vinyl Alcohol (EVOH), LLDPE, or PVC Geomembranes *J. Environmental Eng.*, 144(2): 04017106. ↗
- Foose, G., Benson, C., and Edil, T. (2002), Comparison of Solute Transport in Three Composite Landfill Liners, *J. Geotech. Geoenvironmental Eng.*, 128(5), 391-403. ↗
- Foose, G., Benson, C., and Edil, T. (2001), Predicting Leakage Through Composite Landfill Liners, *J. Geotech. Geoenvironmental Eng.*, 127(6), 510-520. ↗
- Foose, G., Benson, C., and Edil, T. (2001), Analytical Equations for Predicting Concentration and Mass Flux from Composite Landfill Liners, *Geosynthetics Intl.*, 8(6), 551-575. ↗
- Fuhrmann, M., Caldwell, T. Likos, Waugh, W., Williams, M., Benson, C. (2023), Evolving Radon Diffusion Through Earthen Barriers At Uranium Waste Disposal Sites, *J. Environmental Radioactivity*, 262, 107140, <https://doi.org/10.1016/j.jenvrad.2023.107140>. ↗
- Fuhrmann, M., Benson, C., Likos, W., Stefani, N., Michaud, A., Waugh, W., Williams, M. (2021), Radon Fluxes at Four Uranium Mill Tailings Disposal Sites After 20 Years of Service, *J. Environmental Radioactivity*, 237, 106719. ↗
- Fuhrmann, M. , Michaud, A., Salay, M., Benson, C., Likos, W., Stefani, N., Waugh, W., Williams, M. (2019), Lead-210 Profiles in Radon Barriers, Indicators of Long-Term Radon-222 Transport, *Applied Geochemistry*, 110, 104434. ↗
- Geng, W., Liu, M., Benson, C., Likos, W., and Gadikota, G. (2024), Morphological Controls on Hydraulic Conductivity and Viscosity of Bentonite-Polymer Composite, *Environmental Geotechnics*, 11(2), 136–144, <https://doi.org/10.1680/jenge.21.00125>. ↗
- Geng, W., Salihoglu, H., Likos, W., and Benson, C. (2024), Index Tests for Geosynthetic Clay Liners Containing Bentonite-Polymer Composites, *Environmental Geotechnics*, 11(2), 112–123 <https://doi.org/10.1680/jenge.22.00072>. ↗

- Gulec, S., Benson, C., and Edil, T. (2005), Effect of Acidic Mine Drainage (AMD) on the Mechanical and Hydraulic Properties of Three Geosynthetics, *J. Geotech. Geoenvironmental Eng.*, 131(8), 937-950, <https://doi.org/10.1680/jenge.22.00072>. ↗
- Gulec, S., Edil, T., and Benson, C. (2004), Effect of Acidic Mine Drainage (AMD) on the Polymer Properties of an HDPE Geomembrane, *Geosynthetics Intl.*, 11(2), 60-72. ↗
- Gustitus, S., Nguyen, D., Chen, J., and Benson, C. (2021), Quantifying Polymer Loading in Bentonite-Polymer Composites Using Loss on Ignition and Total Carbon Analyses, *Geotech. Testing J.*, doi:10.1520/GTJ20200007. ↗
- Hao, Z., Sun, M., Ducoste, J., Benson, C., Luettich, S., Castaldi, M., and Barlaz, M. (2017), Heat Generation and Accumulation in Municipal Solid Waste Landfills, *Environmental Science & Technology*, 51, 12434-12442. ↗
- Hou, J., Sun, R., and Benson, C. (2023), Hydrodynamic Assessment of Bentonite Granule Size and Swelling on Hydraulic Conductivity of Geosynthetic Clay Liners, *Geotextiles and Geomembranes*, 51, 93-103. ↗
- Hou, J., Xie, X., and Benson, C. (2025), Effect of Geomembrane Texturing Method on Geomembrane-Dry GCL Interface Shear Behavior, *Geotextiles and Geomembranes*, 53, 1185-1199. ↗
- Jacobson, K., Lee, S., Somerville, R., McKenzie, D., Benson, C., and Pedersen, J. (2010), Transport of the Pathogenic Prion Protein Through Soils, *J. Environmental Quality*, 39, 1145-1152. ↗
- Jacobson, K., Lee, S., McKenzie, D., Benson, C., and Pedersen, J. (2008), Transport of the Pathogenic Prion Protein Through Landfill Materials, *Enviro. Science & Technology*, 43(6), 2022-2028. ↗
- Jo, H., Benson, C., and Edil, T. (2006), Rate-Limited Cation Exchange in Thin Bentonitic Barrier Layers, *Canadian Geotech. J.*, 43, 370-391. ↗
- Jo, H., Benson, C., Lee, J., Shackelford, C., and Edil, T. (2005), Long-Term Hydraulic Conductivity of a Non-Prehydrated Geosynthetic Clay Liner Permeated with Inorganic Salt Solutions, *J. Geotech. Geoenvironmental Eng.*, 131(4), 405-417. ↗
- Jo, H., Benson, C., and Edil, T. (2004), Hydraulic Conductivity and Cation Exchange in Non-Prehydrated and Prehydrated Bentonite Permeated with Weak Inorganic Salt Solutions, *Clays and Clay Minerals*, 52(6), 661-679. ↗
- Jo, H., Katsumi, T., Benson, C., and Edil, T. (2001), Hydraulic Conductivity and Swelling of Non-Prehydrated GCLs Permeated with Single Species Salt Solutions, *J. of Geotech. Geoenvironmental Eng.*, 127(7), 557-567. ↗
- Katsumi, T., Benson, C., Foose, G., and Kamon, M. (2001), Performance-Based Design of Landfill Liners, *Engineering Geology*, 60, 139-148. ↗
- Katsumi, T., Benson, C., Foose, G., and Kamon, M. (1999), Evaluation of the Performance of Landfill Liners, *J. Japan Society of Waste Management*, 10(1), 75-85. ↗
- Khire, M., Benson, C., and Bosscher, P. (2000), Capillary Barriers: Design Variables and Water Balance, *J. Geotech. Geoenvironmental Eng.*, 126(8), 695-708. ↗
- Khire, M., Benson, C., and Bosscher, P. (1999), Field Data from a Capillary Barrier in Semi-Arid and Model Predictions with UNSAT-H, *J. Geotech. Geoenvironmental Eng.*, 125(6), 518-528. ↗
- Khire, M., Benson, C., and Bosscher, P. (1997), Water Balance of Two Earthen Landfill Caps in a Semi-Arid Climate, *Land Contamination and Reclamation*, 5(3), 195-202. ↗
- Khire, M., Benson, C., and Bosscher, P. (1997), Water Balance Modeling of Earthen Final Covers, *J. Geotech. Geoenvironmental Eng.*, 123(8), 744-754. ↗
- Kim, H. and Benson, C. (2004), Contributions of Advective and Diffusive Oxygen Transport Through Multilayer Composite Caps Over Mine Waste, *J. Contaminant Hydrology*, 71(1-4), 193-218. ↗

- Kolstad, D., Benson, C., and Edil, T. (2004), Hydraulic Conductivity and Swell of Nonprehydrated GCLs Permeated with Multispecies Inorganic Solutions, *J. Geotech. Geoenvironmental Eng.*, 130(12), 1236-1249. ☞
- Kolstad, D., Benson, C., Edil, T., and Jo, H. (2004), Hydraulic Conductivity of a Dense Prehydrated GCL Permeated with Aggressive Inorganic Solutions, *Geosynthetics Intl.*, 11(3), 233-240. ☞
- Kraus, J., Benson, C., Erickson, A., and Chamberlain, E. (1997), Freeze-Thaw and Hydraulic Conductivity of Bentonitic Barriers, *J. Geotech. Geoenvironmental Eng.*, 123(3) 229-238. ☞
- Kraus, J., Benson, C., Maltby, V., and Wang, X. (1997), Field and Laboratory Hydraulic Conductivity of Compacted Papermill Sludges, *J. Geotech. Geoenviron. Eng.*, 123(7), 654-662. ☞
- Lee, J., Shackelford, C., Benson, C., Jo, H., and Edil, T. (2005), Correlating Index Properties and Hydraulic Conductivity of Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 131(11), 1319-1329. ☞
- Li, Q., Chen, J., Benson, C., and Chen, D. (2020), Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners Permeated with Bauxite Liquor, *J. Geotextiles and Geomembranes*, 49, 420-429. ☞
- Lin, L. and Benson, C. (2000), Effect of Wet-Dry Cycling on Swelling and Hydraulic Conductivity of Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 126(1), 40-49. ☞
- Ma, X., Benson, C., D. McKenzie, J. Aiken, and J. Pedersen (2007), Adsorption of Pathogenic Prion Protein to Quartz Sand, *Environmental Science and Technology*, 41(7), 2324-2330. ☞
- Makusa, G., Bradshaw, S., Berns, E., Benson, C., Knutsson, S. (2014), Freeze-Thaw Cycling and the Hydraulic Conductivity of Geosynthetic Clay Liners Concurrent with Cation Exchange, *Canadian Geotech. J.*, 51(6), 591-598. **(Editor's Choice)** ☞
- Meer, S. and Benson, C. (2007), Hydraulic Conductivity of Geosynthetic Clay Liners Exhumed from Landfill Final Covers, *J. Geotech. Geoenvironmental Eng.*, 133(5), 550-563. ☞
- Meerdink, J., Benson, C., and Khire, M. (1995), Unsaturated Hydraulic Conductivity of Two Compacted Barrier Soils, *J. Geotech. Eng.*, 122(7), 565-576. ☞
- Ogorzalek, A., Bohnhoff, G., Shackelford, C., Benson, C., and Apiwantragoon, P. (2008), Comparison of Field Data and Water-Balance Predictions for a Capillary Barrier Cover, *J. Geotech. Geoenvironmental Eng.*, 134(4), 470-486. ☞
- Othman, M. and Benson, C. (1993), Effect of Freeze-Thaw on the Hydraulic Conductivity and Morphology of Compacted Clay, *Canadian Geotech. J.*, 30(2), 236-246. ☞
- Othman, M. and Benson, C. (1993), Effect of Freeze-Thaw on the Hydraulic Conductivity of Three Compacted Clays from Wisconsin, *J. Transportation Research Board*, 1369, 118-125. ☞
- Palmer, B., Edil, T. and C. H. Benson (2000), Liners for Waste Containment Constructed with Class F and C Fly Ashes, *J. Hazardous Materials*, 18(2-3), 133-161. ☞
- Park, M., Benson, C., and Edil, T. (2012), Comparison of Batch and Double Compartment Tests for Measuring VOC Transport Parameters in Geomembranes, *J. Geotextiles and Geomembranes*, 31, 15-30. ☞
- Park, M., Edil, T., and Benson, C. (2011), Modeling Volatile Organic Compound Transport in Composite Liners, *J. Geotech. Geoenvironmental Eng.*, 138(6), 641-657. ☞
- Pedersen, J., Johnson, C., Bell, C., Jacobson, K., Benson, C., McKenzie, D., and Aiken, J. (2009), Soil and the Transmission of Prion Diseases, *Geochimica et Cosmochimica Acta Suppl.*, 73, A1007. ☞
- Pedersen, J., McMahon, K., and Benson, C. (2006), Prions: Novel Pathogens of Environmental Concern?, *J. of Environmental Engineering*, 132(9), 967-969. ☞
- Rustick, J., Kosson, D., Krahn, S., Ryan, M., Benson, C., and Clarke, J. (2015), Comparison of Low Level Waste Disposal Facilities at Major Department of Energy Sites, *Remediation*, 26(1), DOI: 10.1002/rem, 69-91. ☞

- Scalia, J., Benson, C., and Finnegan, M. (2018), Alternate Procedures for Swell Index Testing of Granular Bentonite from GCLs, *Geotechnical Testing J.*, 0149-6115. ☞
- Scalia, J., Benson, C., Albright, W., Smith, B., and Wang, X. (2017), Properties of Barrier Components in a Composite Cover after 14 Years of Service and Differential Settlement, *J. Geotech. Geoenvironmental Eng.*, 04017055. ☞
- Scalia, J. and Benson, C. (2016), Polymer Fouling and Hydraulic Conductivity of Mixtures of Sodium Bentonite and a Bentonite-Polymer Composite, *J. Geotech. Geoenvironmental Eng.*, 04016112. **(Research Highlight, April 2017 Issue)** ☞
- Scalia, J., Benson, C., Bohnhoff, G., Edil, T., and Shackelford, C. (2014) Long-Term Hydraulic Conductivity of a Bentonite-Polymer Composite Permeated with Aggressive Inorganic Solutions, *J. Geotech. Geoenvironmental Eng.*, 04013025. ☞
- Scalia, J. and Benson, C. (2011), Hydraulic Conductivity of Geosynthetic Clay Liners Exhumed from Landfill Final Covers with Composite Barriers, *J. Geotech. Geoenvironmental Eng.*, 137(1), 1-13. ☞
- Scalia, J. and Benson, C. (2010), Preferential Flow in Geosynthetic Clay Liners Exhumed from Final Covers with Composite Barriers, *Canadian Geotechnical J.*, 47, 1101-1111. ☞
- Scalia, J. and Benson, C. (2010), Effect of Permeant Water on the Hydraulic Conductivity of Exhumed Geosynthetic Clay Liners, *Geotechnical Testing J.*, 33(3), 1-11. ☞
- Scalia, J., Bohnhoff, G., Shackelford, C., Benson, C., Sample-Lord, K., Malusis, M., and Likos, W. (2018), Enhanced Bentonites for Containment of Inorganic Waste Leachates by GCLs, *Geosynthetics Intl.*, 1072-6349, 1-20 **(Best Paper Award for 2018)**. ☞
- Setz, M., Benson, C., Bradshaw, S., and Tian, K. (2018), Lithium Extraction to Determine Ammonium in the Exchange Complex of Bentonite, *Geotechnical Testing J.*, ISSN 0149-6115. ☞
- Setz, M., Tian, K., Benson, C., and Bradshaw, S. (2017), Effect of Ammonium on the Hydraulic Conductivity of Geosynthetic Clay Liners, *J. Geotextiles and Geomembranes*, 45 (2017) 665-673. ☞
- Shackelford, C., Benson, C., Katsumi, T., and Edil, T. (2000), Evaluating the Hydraulic Conductivity of GCLs Permeated with Non-Standard Liquids, *J. Geotextiles Geomembranes*, 18(2-3), 133-161. ☞
- Smesrud, J., Benson, C., Albright, W., Richards, J., Wright, S., Israel, T., and Goodrich, K. (2012), Using Pilot Test Data to Refine an Alternative Cover Design in Northern California, *Intl. J. Phytoremediation*, 14(S1), 76-93. ☞
- Tinjum, J., Benson, C., and Blotz, L. (1997), Soil-Water Characteristic Curves for Compacted Clays, *J. Geotech. Geoenvironmental Eng.*, 123(11), 1060-1070. ☞
- Tian, K. and Benson, C. (2018), Radiation Dose and Antioxidant Depletion in HDPE Geomembranes, *J. Geotextiles and Geomembranes*, 46, 426-435. **(Best Paper Award for 2018)** ☞
- Tian, K., Benson, C., and Likos, W. (2016), Hydraulic Conductivity of Geosynthetic Clay Liners to Low-Level Radioactive Waste Leachate, *J. Geotech. Geoenvironmental Eng.*, 04016037. ☞
- Tian, K., Likos, W., and Benson, C. (2019), Polymer Elution and Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 145(10), 04019071. ☞
- Tian, K., Benson, C., Tinjum, J. and Edil, T. (2017), Antioxidant Depletion and Service Life Prediction for HDPE Geomembranes Exposed to Low-Level Radioactive Waste Leachate, *J. Geotech. Geoenvironmental Eng.*, 04017011. **(Editor's Choice)**. ☞
- Tian, K., Benson, C., and Tinjum, J. (2017), Chemical Characteristics of Leachate in Low-Level Radioactive Waste Disposal Facilities, *J. Hazardous, Toxic, & Radioactive Waste Mgmt.*, 21(4), 04017010. **(Editor's Choice)**. ☞
- Trast, J. and Benson, C. (1995), Estimating Field Hydraulic Conductivity of Compacted Clay, *J. Geotech. Eng.*, 121(10), 736-740. ☞
- Tuspsakhare, S. Moutushi, T. Luettich, S., Benson, C., Barlaz, M., and Castaldi, M. (2020), The Impact of Pressure, Moisture and Temperature on Pyrolysis of Municipal Solid Waste under

- Simulated Landfill Conditions and Relevance to the Field Data from Elevated Temperature Landfill, *Science of the Total Environment*, 723, 138031. ↗
- Wang, X. and Benson, C. (1999), Hydraulic Conductivity Testing of Geosynthetic Clay Liners Using the Constant Volume Method, *Geotechnical Testing J.*, 22(4), 277-283. ↗
- Wang, X. and Benson, C. (1995), Infiltration and Field-Saturated Hydraulic Conductivity of Compacted Clay, *J. Geotech. Eng.*, 121(10), 713-722. ↗
- Waugh, W., Benson, C., and Albright, W. (2015), Evaluation of Soil Manipulation Methods to Transform Engineered Earthen Covers for Long-Term Waste Containment, *J. Environmental Quality*, doi:10.2134/jeq2015.01.0001. ↗
- Williams, T., Benson, C., Tian, K., Yesiller, N., and Hanson, J., (2024), Hydraulic and Geochemical Characteristics of a Geosynthetic Clay Liner Exhumed from an Exposed Composite Liner, *J. Geotech. Geoenvironmental Eng.*, 150(5), 05024002. ↗
- Yesiller, N., Hanson, J., Risken, J., Benson, C., Abichou, T., and Darius, J. (2019), Hydration Fluid and Field Exposure Effects on Moisture-Suction Response of Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 145(4): 04019010 (**Editor's Choice**) ↗
- Zhai, H. and Benson, C. (2006), The Log-Normal Distribution for Hydraulic Conductivity of Compacted Clays: Two or Three Parameters?, *Geotechnical and Geological Engineering*, 24(5), 1149-1162. ↗

Refereed Journal Articles: Sustainability and Sustainable Infrastructure

- Aguirre-Villegas, H. and Benson, C. (2022), Expectations for Coal Demand in Response to Evolving Carbon Policy and Climate Change Awareness, *Energies*, 15, 3739. ↗
- Aguirre-Villegas, H. and Benson, C. (2017), Case History of Environmental Impacts of an Indonesian Coal Supply Chain, *J. Cleaner Production*, 157, 47-56. ↗
- Bareither, C., Wolfe, G., McMahon, K., and Benson, C. (2013), Microbial Diversity and Dynamics During Methane Production from Municipal Solid Waste, *Waste Management*, 30, 1982-1992. ↗
- Bareither, C., Breitmeyer, R., Benson, C., Barlaz, M., and Edil, T. (2012), Deer Track Bioreactor Experiment: Field-Scale Evaluation of Municipal Solid Waste Bioreactor Performance, *J. Geotech. Geoenvironmental Eng.*, 138(6), 658-670. ↗
- Bareither, C., Benson, C., and Edil, T. (2012), Compression Behavior of Municipal Solid Waste: Immediate Compression, *J. Geotech. Geoenvironmental Eng.*, 138(9), 1047-1062. ↗
- Bareither, C., Benson, C., and Edil, T. (2013), Compression of Municipal Solid Waste in Bioreactor Landfills: Mechanical Creep and Biocompression, *J. Geotech. Geoenvironmental Eng.*, 139(7), 1007-1021. ↗
- Bareither, C., Benson, C., Edil, T., and Barlaz, M. (2012), Abiotic and Biotic Compression of Municipal Solid Waste, *J. Geotech. Geoenvironmental Eng.*, 138(8), 877-888. ↗
- Bradshaw, S., Aguirre-Villegas, H., Boxman, S., and Benson, C. (2025), Material Recovery Facilities (MRFs) in the United States: Operations, Revenue, and the Impact of Scale, *Waste Management*, 193, 317-327. ↗
- Breitmeyer, R. and Benson, C. (2014), Evaluation of Parameterization Techniques for Unsaturated Hydraulic Conductivity Functions for Municipal Solid Waste, *Geotech. Testing J.*, 37(4) 1-10. ↗
- Breitmeyer, R., Benson, C., and Edil, T. (2020), Effect of Changing Unit Weight and Decomposition on Unsaturated Hydraulic Properties of Municipal Solid Waste In Bioreactor Landfills, *J. Geotech. Geoenvironmental Eng.*, 146(5): 04020021. ↗
- Breitmeyer, R., Benson, C., and Edil, T. (2019), Effects of Compression and Decomposition on Saturated Hydraulic Conductivity of Municipal Solid Waste in Bioreactor Landfills, *J. Geotech. Geoenvironmental Eng.*, 145(4): 04019011. (**Smart Brief**) ↗

- Benson, C. and Khire, M. (1994), Reinforcing Sand with Strips of Reclaimed High Density Polyethylene, *J. Geotech. Eng.*, 120(5), 838-855. ☞
- Bin-Shafique, S., Benson, C., Edil, T., and Hwang, K. (2006), Leachate Concentrations from Water Leach and Column Leach Tests on Fly-Ash Stabilized Soil, *Environmental Engineering Science*, 23(1), 51-65. ☞
- Bin-Shafique, S., Edil, T., and Benson, C. (2004), Incorporating a Fly Ash Stabilized Layer into Pavement Design: Case Study, *Geotechnical Engineering*, 157(4), 239-249. ☞
- Camargo, F., Edil, T., and Benson, C. (2013), Strength and Stiffness of Recycled Pavement Materials Stabilized with Fly Ash: A Laboratory Study, *Road Materials and Pavement Design*, 14(2) 1-13. ☞
- Carpenter, A., Gardner, K., Fopiano, J., Benson, C., and Edil, T. (2007), Life Cycle Based Risk Assessment of Recycled Materials in Roadway Construction, *Waste Mgmt.*, 27, 1458-1464. ☞
- Dingrando, J., Edil, T., and Benson, C. (2004), Beneficial Reuse of Foundry Sands in Controlled Low Strength Material, *J. ASTM Intl.*, 1(6), 1-12. ☞
- Ebrahimi, A., Kootstra, B., Edil, T., and Benson, C. (2012), Practical Approach for Designing Flexible Pavements Using Recycled Roadway Materials as Base Course, *Road Materials and Pavement Design*, 13(3), 1-18. ☞
- Edil, T., Acosta, H., and Benson, C. (2006), Stabilizing Soft Fine-Grained Soils with Fly Ash, *J. Materials in Civil Engineering*, 18(2), 283-294. ☞
- Edil, T., Benson, C., Bin-Shafique, M., Tanyu, B., Kim, W., and Senol, A. (2002), Field Evaluation of Construction Alternatives for Roadway Over Soft Subgrade, *J. Transportation Research Board*, 1786, 36-48. ☞
- Foose, G., Benson, C., and Bosscher, P. (1996), Sand Reinforced with Shredded Waste Tires, *J. Geotech. Eng.*, 122(9), 760-767. ☞
- Goodhue, M. Edil, T., and Benson, C. (2001), Interaction of Foundry Sands with Geosynthetics, *J. Geotech. Geoenvironmental Eng.*, 127(4), 353-362. ☞
- Komonweeraket, K., Cetin, B., Aydilek, A., Benson, C., Edil, T. (2014), Effects of pH on the Leaching Mechanisms of Elements from Fly Ash Mixed Soils, *Fuel*, American Chemical Society, 140, 788-802. ☞
- Komonweeraket, K., Cetin, B., Aydilek, A., Benson, C., and Edil, T. (2015), Geochemical Analysis of Leached Elements from Fly Ash Stabilized Soils, *J. Geotech. Geoenviron. Eng.*, 04015012. ☞
- Komonweeraket, K., Cetin, B., Aydilek, A., Benson, C., Edil, T. (2015), Leaching Characteristics of Toxic Constituents from Coal Fly Ash Mixed Soils under the Influence of pH, *Waste Management*, 38, 174-184. ☞
- Kleven, J., Edil, T., and Benson, C. (2000), Evaluation of Excess Foundry System Sands for Use as Subbase Material, *J. Transportation Research Board*, 1714, 40-48. ☞
- Lee, J., Edil, T., Benson, C., and Tinjum, J., (2013), Building Environmentally and Economically Sustainable Transportation Infrastructure: Green Highway Rating System, *J. Construction Engineering and Management*, 139(12), A4013006. ☞
- Lee, J., Bradshaw, S., Edil, T., and Benson, C. (2012) Quantifying the Benefits of Flue Gas Desulfurization Gypsum in Sustainable Wallboard Production, *Coal Combustion and Gasification Products J.*, 4, 17-20. ☞
- Lee, J., Edil, T., Benson, C., and Tinjum, J., (2011), Evaluation of Variables Affecting Sustainable Highway Design with BE²ST-in-Highways System, *J. Transportation Res. Board*, 2233, 178-186. ☞
- Lee, J., Edil, T., Tinjum, J., and Benson, C. (2010), Quantitative Assessment of Environmental and Economic Benefits of Using Recycled Construction Materials in Highway Construction, *J. Transportation Research Board*, 2158, 138-142. ☞
- Lee, T. and Benson, C. (2006), Leaching Behavior of Green Sands from Gray-Iron Foundries Used for Reactive Barrier Applications, *Environmental Engineering Science*, 23(1), 153-167. ☞

- Li, L., Benson, C., Edil, T., and Hatipoglu, B. (2007), Groundwater Impacts from Coal Ash in Highways, *Waste and Resource Management*, 159(4), 151-162. ↗
- Li, L., Benson, C., Edil, T., and Hatipoglu, B. (2008), Sustainable Construction Case History: Fly Ash Stabilization of Recycled Asphalt Pavement Material, *Geotechnical and Geological Engineering*, 26, 177-187. ↗
- Li, L., Edil, T., and Benson, C. (2009), Mechanical Performance of Pavement Geomaterials Stabilized with Fly Ash in Field Applications, *Coal Combustion and Gasification Products*, 1: 43-49, doi:10.4177/CCGP-D-09-00018.1. ↗
- Li, H. et al. (2022), Expanding Plastics Recycling Technologies: Chemical Aspects, Technology Status, and Challenges, *Green Chemistry*, <https://doi.org/10.1039/D2GC02588D>. ↗
- Liu, X., Wen, H., Edil, T., and Benson, C. (2010), Stabilization of Flue Gas Desulphurization By-Products with Fly Ash, Cement, and Sialite, *J. Transportation Research Board*, 2204, 102-109. ↗
- Ma, J. et al. (2023), Economic Evaluation of Infrastructures for Thermochemical Upcycling of Post-Consumer Plastic Waste, *Green Chemistry*, 2025, 3, <https://doi.org/10.1039/d2gc04005k>. ↗
- Olafasakin, O. et al. (2023), Techno-Economic and Life Cycle Assessment of Standalone Single-Stream Material Recovery Facilities in the United States, *Waste Management*, 166, 368–376. ↗
- Rosa, M., Cetin, B., Edil, T., and Benson, C. (2016), Development of a Test Procedure for Freeze-Thaw Durability of Geomaterials Stabilized with Fly Ash, *Geotech. Testing J.*, 39(6) 938-953. ↗
- Rosa, M., Cetin, B., Edil, T., and Benson, C. (2017), Freeze-Thaw Performance of Fly Ash Stabilized Materials and Recycled Pavement Materials, *J. Materials in Civil Engineering*, 04017015. ↗
- Sauer, J., Benson, C., Aydilek, A., and Edil, T. (2012), Trace Elements Leaching from Organic Soils Stabilized with High Carbon Fly Ash, *J. Geotech. Geoenvironmental Eng.*, 138(8), 968-980. ↗
- Senol, A., Edil, T., Bin-Shafique, S., Acosta, H., and Benson, C. (2006), Soft Subgrade Stabilization Using Fly Ashes, *Resources, Conservation and Recycling*, 46(4), 365-376. ↗
- Senol, A., Bin-Shafique, S., Edil, T., and Benson, C. (2003), Use of Class C Fly Ash for Stabilization of Soft Subgrade, *ARI, Bulletin Istanbul Technical University*, 53(1), 98-104. ↗
- Soleimanbeigi, A., Edil, T., and Benson, C. (2013), Evaluation of Fly Ash Stabilization of Recycled Asphalt Shingles for Use in Structural Fills, *J. Materials Civil Eng.*, 25(1), 94-104. ↗
- Soleimanbeigi, A., Edil, T., and Benson, C. (2014), Creep Response of Recycled Asphalt Shingles, *Canadian Geotechnical J.*, 51, 103-114. ↗
- Soleimanbeigi, A., Edil, T., and Benson, C. (2014), Effect of Temperature on Geotechnical Properties of Recycled Asphalt Shingle Mixtures, *J. Geotech. Geoenvironmental Eng.*, 04014097. ↗
- Tanyu, B., Kim, W., Edil, T., and Benson, C., (2006), Development of Methodology to Include Structural Contribution of Alternative Working Platforms in Pavement Structure, *J. Transportation Research Board*, 1936, 70-77. ↗
- Tanyu, B., Benson, C., Edil, T., and Kim, W. (2005), Equivalency of Crushed Rock and Three Industrial By-Products Used for Working Platforms During Pavement Construction, *J. Transportation Research Board*, 1874, 59-69. ↗
- Tastan, O., Edil, T., Benson, C., and Aydilek, A. (2011), Stabilization of Organic Soils with Fly Ash, *J. Geotech. Geoenvironmental Eng.*, 137(9), 819-833. ↗
- Tatliso, N., Edil, T., and Benson, C. (1998), Interaction between Reinforcing Geosynthetics and Soil-Tire Chip Mixtures, *J. Geotech. Geoenvironmental Eng.*, 124(11), 1109-1119. ↗
- Trzebiatowski, B. and Benson, C. (2005), Saturated Hydraulic Conductivity of Compacted Recycled Asphalt Pavement, *Geotech. Testing J.*, 28(5), 514-519. ↗

Refereed Journal Articles: Groundwater

- Alumbaugh, D., Simon, D. and Benson, C. (2005), Comparison of Three Geophysical Methods for Characterizing Air Flow from an Air Sparging Well, *Near Surface Geophysics, Part II: Applications and Case Histories*, Society of Exploration Geophysicists, 20, 1-12. ↵
- Baker, D. and Benson, C. (2007), Effect of System Variables and Particle Size on Physical Characteristics of Air Sparging Plumes, *Geotechnical and Geological Engineering*, 25(5), 543-558. ↵
- Benson, C., Jo, H., and Musso, T. (2014), Hydraulic Conductivity of an Organoclay and Organoclay-Sand Mixtures to Fuels and Organic Liquids, *J. Geotech. Geoenviron. Eng.*, 125(11), 04014094. ↵
- Christman, M., Benson, C., and Edil, T. (2002), Geophysical Evaluation of Annular Well Seals, *Ground Water Monitoring and Remediation*, 22(3), 104-112. ↵
- Cope, D. and Benson, C. (2009), Grey-Iron Foundry Slags as Reactive Media for Removing Trichloroethylene from Groundwater, *Environ. Science & Technology*, 43(1), 169-175. ↵
- Elder, C. and Benson, C. (2019), Performance and Economic Comparison of PRB Types in Heterogeneous Aquifers, *Environmental Geotechnics*, 6(4), 214-224. ↵
- Elder, C., Benson, C., and Eykholt, G. (2002), Effects of Heterogeneity on Influent and Effluent Concentrations from Horizontal Permeable Reactive Barriers, *Water Resources Research*, 38(8), 27-1 to 27-2. ↵
- Elder, C. and Benson, C., and Eykholt, G. (1999), Modeling Mass Removal During In Situ Air Sparging, *J. Geotech. Geoenvironmental Eng.*, 125(11), 947-958. ↵
- Elder, C. and Benson, C. (1999), Air Channel Formation, Size, Spacing, and Tortuosity During Air Sparging, *Ground Water Monitoring and Remediation*, 19(3), 171-181. ↵
- Eykholt, G., Elder, C., and Benson, C. (1999), Effects of Aquifer Heterogeneity and Reaction Mechanisms Uncertainty on a Reactive Barrier, *J. Hazardous Materials*, 68, 73-96. ↵
- Foose, G., Tachavises, C., Benson, C., and Edil, T. (1998), Analyzing Geoenvironmental Engineering Problems Using MODFLOW, *Naresuan University J.*, Thailand, 6(2), 38-44. ↵
- Lee, S., Oren, A., Benson, C., and Dovantzis, K. (2012), Organoclays as Variably Permeable Reactive Barrier (VPRB) Media to Manage NAPLs in Ground Water, *J. Geotech. Geoenvironmental Eng.*, 138(2), 115-127. ↵
- Lee, T. and Benson, C. (2004), Sorption and Degradation of Alachlor and Metolachlor in Ground Water Using Green Sands, *J. Environmental Quality*, 33(5), 1682-1693. ↵
- Lee, T., Benson, C., and Eykholt, G. (2004), Waste Green Sands as Reactive Media for Groundwater Contaminated with Trichloroethylene, *J. Hazardous Materials*, 109 (1-3), 25-36. ↵
- Lee, T. and Benson, C. (2000), Flow Paste Bench-Scale Vertical Groundwater Cut-Off Walls, *J. Geotech. Geoenvironmental Eng.*, 126(6) 511-520. ↵
- Li, L. and Benson, C. (2010), Evaluation of Five Strategies to Limit the Impact of Fouling in Permeable Reactive Barriers, *J. Hazardous Materials*, 181, 170-180. ↵
- Li, L., Benson, C., and Lawson, E. (2006), Modeling Porosity Reductions Caused by Mineral Fouling in Continuous-Wall Permeable Reactive Barriers, *J. Contaminant Hydrology*, 83 (1-2), 89-121. ↵
- Li, L., Benson, C., and Lawson, E. (2005), Impact of Mineral Fouling on Hydraulic Behavior of Permeable Reactive Barriers, *Ground Water*, 43(4), 582-596. ↵
- Pekarun, O., Benson, C., and Edil, T. (1997), Significance of Defects in Annular Well Seals, *Practice Periodical Hazardous, Toxic, and Radioactive Waste*, 2(2) 1-7. ↵
- Tinjum, J., Benson, C., and Edil, T. (2008), Mobilization of Cr(VI) from Chromite Ore Processing Residue through Acid Treatment, *Science of the Total Environment*, 391, 13-25. ↵
- Tinjum, J., Benson, C., and Edil, T. (2008), Treatment of Cr(VI) in Chromium Ore Processing Residue Using Ferrous Sulfate-Sulfuric Acid or Cationic Polysulfides, *J. Geotech. Geoenvironmental Eng.*, 134(12), 1791-1803. ↵

Yesiller, N., Benson, C., and Edil, T. (1997), Field Evaluation of an Ultrasonic Method for Assessing Well Seals, *Ground Water Monitoring and Remediation*, 17(3), 169-177. ☞

Yesiller, N., Edil, T., and Benson, C. (1997), Ultrasonic Method for Evaluation of Annular Seals for Wells and Instrument Holes, *Geotech. Testing J.*, 20(1), 17-28. ☞

Refereed Journal Articles: Other Topics

Albrecht, B., Benson, C., and Beuermann, S. (2003), Polymer Capacitance Sensors for Measuring Soil Gas Humidity in Drier Soils, *Geotech. Testing J.*, 26(1) 3-12. ☞

Bareither, C. and Benson, C. (2013), Evaluation of Bouwer-Rice Large-Particle Correction Procedure for Soil Water Characteristic Curves, *Geotechnical Testing J.*, 36(5), 680-694. ☞

Bareither, C., Benson, C., and Edil, T. (2008), Reproducibility of Direct Shear Tests Conducted on Granular Backfill Materials, *Geotechnical Testing J.*, 31(1) 1-11. ☞

Bareither, C., Benson, C., and Edil, T. (2008), Comparison of Shear Strength of Sand Backfills Measured in Small-Scale and Large-Scale Direct Shear Tests, *Canadian Geotechnical J.*, 45, 1242-1236. ☞

Bareither, C., Edil, T., Benson, C., and Mickelson, D. (2008), Geological and Physical Factors Affecting the Friction Angle of Compacted Sands, *J. Geotech. Geoenvironmental Eng.*, 134(10), 1476-1489. ☞

Bareither, C., Barlaz, M., Doran, M., and Benson, C. (2016), Retrospective Analysis of Wisconsin's Landfill Organic Stability Rule, *J. Environmental Engineering*, 143(5), 04017001. ☞

Camargo, F., Edil, T., and Benson, C. (2012), An Assessment of Resilient Modulus Testing: Internal and External Deflection Measurements, *Geotechnical Testing J.*, 35(6), 1-8. ☞

Chalermyanont, T. and Benson, C. (2005), Reliability Based Design for External Stability of Mechanically Stabilized Earth (MSE) Walls, *Intl. J. Geomechanics*, 5(3), 196-205. ☞

Chalermyanont, T. and Benson, C. (2004), Reliability-Based Design for Internal Stability of Mechanically Stabilized Earth (MSE) Walls, *J. Geotech. Geoenvironmental Eng.*, 130(2), 163-173. ☞

Fall, M., Sawangsuriya, A., Benson, C., Edil, T., and Bosscher, P. (2008), On the Investigations of Resilient Modulus of Residual Tropical Gravel Lateritic Soils from Senegal (West Africa), *Geotechnical and Geological Engineering*, 26, 13-35. ☞

Jong, D., Bosscher, P., and Benson, C. (1998), Field Assessment of Changes in Pavement Moduli Caused by Freezing and Thawing, *J. Transportation Research Board*, 1615, 41-50. ☞

Kanitpong, K., Benson, C., and Bahia, H. (2001), Hydraulic Conductivity (Permeability) of Laboratory-Compacted Asphalt Mixtures, *J. Transportation Research Board*, 1767, 25-33. ☞

Kim, W., Edil, T., Benson, C., and Tanyu, B., (2006), Deflection of Prototype Geosynthetic-Reinforced Working Platforms Over Soft Subgrade, *J. Transportation Research Board*, 1975, 137-145. ☞

Kim, W., Edil, T., Benson, C., and Tanyu, B., (2005), Structural Contribution Geosynthetic-Reinforced Working Platforms in Flexible Pavement, *J. Trans. Research Board*, 1936, 43-50. ☞

Mengelt, M., Edil, T., and Benson, C. (2006), Resilient Modulus and Plastic Deformation of Soil Confined in a Geocell, *Geosynthetics Intl.*, 13(5), 1-11. ☞

Rosa, M., Cetin, B., Edil, T., and Benson, C. (2016), Development of a Test Procedure for Freeze-Thaw Durability of Geomaterials Stabilized with Fly Ash, *Geotech. Testing J.*, 39(6), 938-953. ☞

Russell, J., Benson, C., and Fox, P. (1990), A Stochastic Decision Model for Contractor Prequalification, *Microcomputers in Civil Engineering*, 5(4), 285-297. ☞

Sawangsuriya, A., Edil, T., and Benson, C. (2008), Effect of Suction on the Resilient Modulus of Compacted Fine-Grained Subgrade Soils, *J. Transportation Research Board*, 2101, 82-87. ☞

- Suwansawat, S. and Benson, C. (1998), Cell Size for Water Content-Dielectric Constant Calibrations for Time Domain Reflectometry, *Geotechnical Testing J.*, 22(1), 3-12. ↗
- Tanyu, B., Aydilek, A., Lau, A., Edil, T., and Benson, C. (2013) Laboratory Evaluation of Geocell-Reinforced Gravel Subbase Over Poor Subgrades, *Geosynthetics Intl.*, 20(2), 47-61. ([Editor's Choice](#)). ↗
- Yesiller, N., Benson, C., and Bosscher, P. (1996), Comparison of Load Restriction Timings Determined Using FHWA Guidelines and Frost Tubes, *J. Cold Regions Eng.*, 10(1), 6-24. ↗
- Wainwright, H. et al. (2023), Nuclear Waste Educator's Workshop: What and How Do We Teach About Nuclear Waste?, *J. Environmental Radioactivity*, 270, 107288. ↗
- Wang, X. and Benson, C. (2004), Leak-Free Pressure Plate Extractor for Measuring the Soil Water Characteristic Curve, *Geotech. Testing J.*, 27(2), 1-10. ↗

Discussions

- Barlaz, M., Benson, C., Castaldi, M., and Luetlich, S. (2018), Comment on "Spatial and Temporal Characteristics of Elevated Temperatures in Municipal Solid Waste Landfills," by N. Jafari, T. Stark, and T. Thalhamer, *Waste Management*, 71, 244-245. ↗
- Benson, C. and Edil, T. (2004) Comment on "A Polymer Membrane Containing Fe⁰ as a Contaminant Barrier" by T. Shimitori et al., *Environ. Science and Tech.*, 38(19), 5263. ↗

Refereed Conference Papers

- Abichou, T., Edil, T., Benson, C., and Tawfiq, K. (2004), Hydraulic Conductivity of Foundry Sands and Their Use as Hydraulic Barriers, *Beneficial Reuse of Waste Materials in Geotechnical and Transportation Applications*, GSP No. 127, A. Aydilek and J. Wartman, eds., ASCE, Reston, VA, 186-200. ↗
- Abichou, T., Tawfiq, K., Edil, T., and Benson, C., (2004), Behavior of a Soil-Tire Shreds Backfill for Modular Block Wall, *Beneficial Reuse of Waste Materials in Geotechnical and Transportation Applications*, GSP No. 127, A. Aydilek and J. Wartman, eds., ASCE, Reston, VA, 162-172. ↗
- Abichou, T., Benson, C., Friend, M., and Wang, X. (2002), Hydraulic Conductivity of a Fractured Aquitard, *Evaluation and Remediation of Low Permeability and Dual Porosity Environments*, STP 1415, M. Sara and L. Everett, Eds., ASTM International, West Conshohocken, PA, 25-39. ↗
- Abichou, T., Benson, C., and Edil, T. (1998), Database on Beneficial Reuse of Foundry By-Products, *Recycled Materials in Geotechnical Applications*, GSP No. 79, ASCE, C. Vipulanandan and D. Elton, eds., 210-224. ↗
- Abichou, T., Benson, C., Edil, T., and Freber, B. (1998), Using Waste Foundry Sand for Hydraulic Barriers, *Recycled Materials in Geotechnical Applications*, GSP No. 79, ASCE, C. Vipulanandan and D. Elton, eds., 86-99. ↗
- Akin, I., Chen, J., Benson, C., and Likos, W. (2018), Evaluation of Water Vapor Sorption and Electrical Conductivity Methods to Determine Bentonite Content of a Soil-Bentonite Barrier, *Proc. IFCEE 2018, Developments in Earth Retention, Support Systems, and Tunneling*, GSP No. 297, ASCE, Lemnitzer, A., Stuedlein, A., and Suleiman, M., eds., 238-246. ↗
- Akin, I., Chen, J., Likos, W., and Benson, C. (2017), Water Vapor Sorption of Bentonite-Polymer Mixtures Contacted with Aggressive Leachates, *Geotechnical Frontiers 2017, Waste Containment, Barriers, Remediation, and Sustainable Geoengineering*, GSP No. 276, ASCE, T. Brandon and R. Valentine, eds., 210-218. ↗
- Albright, W., Scalia, J., Benson, C., and Smith, B. (2014), Effects of Age and Differential Settlement on Composite Barrier Components in a Landfill Final Cover, *Proceedings Waste Management '14, WM Symposia Inc.*, Phoenix, AZ, 1-10. (**Best Paper Award**) ↗

- Athanassopoulos, C., Benson, C., Chen, J., and Donovan, M. (2015), Hydraulic Conductivity of a Polymer-Modified GCL Permeated with High-pH Solutions, *Geosynthetics 2015*, IFAI, St. Paul, MN, 181-186. ☞
- Apiwantragoon, P., Benson, C., and Albright, W. (2003), Comparison of Water Balance Predictions Made with HYDRUS-2D and Field Data from the Alternative Cover Assessment Program (ACAP), *Proc. MODFLOW and More 2003: Understanding through Modeling*, International Groundwater Modeling Center, Golden, CO, 751-755. ☞
- Apiwantragoon, P. and Benson, C. (2025), Water Balance Landfill Covers: Hydraulic Performance and Equivalency, *Geoenvironmental Engineering*, GSP No. 362, M. Othman and N. Yesiller, eds., ASCE, Reston, VA, 145-168. ☞
- Baker, D. and Benson, C. (1996), Review of Factors Affecting In Situ Air Sparging, *Non-Aqueous Phase Liquids in Subsurface Remediation*, ASCE, L. Reddi, ed., 292-310. ☞
- Bareither, C., Benson, C., and Edil, T. (2012), Recent Findings on Compressibility of Municipal Solid Waste, *State of the Art and Practice in Geotechnical Engineering*, GSP No. 225, R. Hryciw et al., Eds., ASCE, Reston VA, 4212-4221. ☞
- Bareither, C., Breitmeyer, R., Erses, A., Benson, C., Edil, T., and Barlaz, M. (2008), Relative Contributions of Moisture and Biological Activity on Compression of Municipal Solid Waste in Bioreactor Landfills, *Proceedings, Global Waste Management Symposium 2008*, Penton Media, Orlando, 1-9. ☞
- Bareither, C., Edil, T., and Benson, C. (2012), Investigation of White Bluffs Landslides in Washington State, *State of the Art and Practice in Geotechnical Engineering*, GSP No. 225, R. Hryciw et al., eds., ASCE, Reston VA, 546-555. ☞
- Benson, C., Albright, W., Apiwantragoon, P., and Lyles, B. (2022), Hydrology of Final Covers for Overburden Piles and Pit Backfill at High Elevation Mine Sites in Southeastern Idaho, *Proc. Tailings and Mine Waste*, Colorado State University, 1-12. ☞
- Benson, C. (2017), Using Principles of Unsaturated Soil Behavior to Design Water Balance Covers for Waste Containment: Case Study, *Proc. PanAm Unsaturated Soils 2017, Plenary Papers*, GSP No. 300, L. Hoyos, J. McCartney, S. Houston, and W. Likos, eds., ASCE, Reston VA, 306-324. ☞
- Benson, C. (2017), Characteristics of Gas and Leachate at an Elevated Temperature Landfill, *Geotechnical Frontiers 2017, Waste Containment, Barriers, Remediation, and Sustainable Geoengineering*, GSP No. 276, ASCE, T. Brandon and R. Valentine, eds., 313-322. ☞
- Benson, C. (2013), Impact of Subgrade Water Content on Cation Exchange and Hydraulic Conductivity of Geosynthetic Clay Liners in Composite Barriers, in *Coupled Phenomena in Environmental Geotechnics*, M. Manassero et al., eds., CRC Press, Boca Raton, FL, USA, 1-6. ☞
- Benson, C., Albright, W., Fuhrmann, M., Likos, W., Stefani, N., Tian, K., Waugh, W., and Williams, M. (2017), Radon Fluxes from an Earthen Barrier Over Uranium Mill Tailings After Two Decades of Service, *Proceedings Waste Management '17*, WM Symposia Inc., Phoenix, AZ, 1-10. ☞
- Benson, C., Chen, J., and Tian, K. (2021), Stress-Induced Pore Water Pressures in the Vadose Zone Beneath a Composite Lined Landfill, *Third International Symposium on Coupled Phenomena in Environmental Geotechnics*, Japanese Geotechnical Society Special Publication, Vol. 9, Japanese Geotechnical Society, Tokyo, 478-484. ☞
- Benson, C., Chiang, I., Chalermyanont, T., and Sawangsuriya, A. (2014), Estimating van Genuchten Parameters α and n for Clean Sands from Particle Size Distribution Data, *From Soil Behavior to Innovations in Geotechnical Engineering*, GSP No. 233, M. Iskander, J. Garlanger, and M. Hussein, Eds., ASCE, Reston VA, 410-427. ☞
- Benson, C. and Gurdal, T. (2013), Hydrologic Properties of Final Cover Soils, *Foundation Engineering in the Face of Uncertainty*, GSP No. 229, J. Withiam et al., Eds., ASCE, Reston VA, 283-297. ☞

- Benson, C. and Bareither, C. (2012), Designing Water Balance Covers for Sustainable Waste Containment: Transitioning State-of-the-Art to State-of-the-Practice, *State of the Art and Practice in Geotechnical Engineering, Keynote Lectures from GeoCongress 2012*, GSP No. 226, K. Rollins and D. Zekkos, eds., ASCE, Reston VA, 1-32. ☞
- Benson, C., Tan, Y., Youngblood, J., and Bradshaw, S. (2022), Bentonite-Polymer Composite Geosynthetic Clay Liners for Heap Leach Liners, *Proc. 5th International Conference on Heap Leach Mining Solutions 2022*, C3 Alliance, Vancouver, 13-25. ☞
- Benson, C., Tan, Y., Youngblood, J., and Bradshaw, S. (2023), Effect of Initial Stress on Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners for Heap Leach Liners, *Geosynthetics 2023*, Advanced Textiles Association, Rosemont, MN, 592-603. ☞
- Benson, C. and Tian, K. (2019), Stress-Induced Porewater Pressures in the Vadose Zone Beneath a Mixed Waste Landfill, *Proc. Waste Management '19*, WM Symposia Inc., Phoenix, AZ (**Superior Paper Award**). ☞
- Benson, C., Waugh, W., Albright, W., Smith, G., and Bush, R. (2011), Design and Installation of a Disposal Cell Cover Field Test, *Proc. Waste Management '11*, WM Symposia Inc., Phoenix, AZ. ☞
- Benson, C. and Bareither, C. (2010), Bioreactor Landfills: Lessons Learned in North America, *Proc. Sixth Asian-Pacific Landfill Symposium*, Korean Society of Waste Management, Seoul, 54-72. ☞
- Benson, C. (2010), Predictions in Geoenvironmental Engineering: Recommendations for Reliable Predictive Modeling, *GeoFlorida 2010, Advances in Analysis, Modeling, and Design*, Geotechnical Special Publication No. 199, D. Fratta, A. Puppula, and B. Muhunthan, eds., ASCE, Reston, VA, 1-13. ☞
- Benson, C. and Scalia, J. (2010), Hydraulic Conductivity of Exhumed Geosynthetic Clay Liners from Composite Barriers, *Proc. 3rd Intl. Symposium on Geosynthetic Clay Liners*, SKZ – ConSem GmbH, Wurzburg, Germany, 73-82. ☞
- Benson, C., Wang, X., Gassner, F., and Foo, D. (2008), Hydraulic Conductivity of Two Geosynthetic Clay Liners Permeated with an Aluminum Residue Leachate, *GeoAmericas 2008*, International Geosynthetics Society. ☞
- Benson, C. Albright, W., Ray, D., Smegal, J., Robertson, O., and Gupta, D. (2008). Evaluating Operational Irregularities at Hanford's Environmental Restoration Disposal Facility, *Proc. Waste Management '08*, WM Symposia Inc., Phoenix, AZ. ☞
- Benson, C. (2007), Modeling Unsaturated Flow and Atmospheric Interactions, *Theoretical and Numerical Unsaturated Soil Mechanics*, T. Schanz, Ed., Springer, Berlin, 187-202. ☞
- Benson, C. and Wang, X. (2006), Temperature-Compensating Calibration Procedure for Water Content Reflectometers, *Proceedings TDR 2006: 3rd Intl. Symposium and Workshop on Time Domain Reflectometry for Innovative Soils Applications*, Purdue University, West Lafayette, IN, USA, 50-1 - 5-16. ☞
- Benson, C., Bohnhoff, G., Ogorzalek, A., Shackelford, C., Apiwantragoon, P., and Albright, W. (2005), Field Data and Model Predictions for an Alternative Cover, *Waste Containment and Remediation*, GSP No. 142, A. Alshawabkeh et al., eds., ASCE, Reston, VA, 1-12. ☞
- Benson, C., Tipton, R., Kumthekar, U., and Chiou, J. (2003), Web-Based Data Management System for Long-Term Performance Monitoring and Stewardship of a Low-Level Radioactive Waste Disposal Facility, *Proc. Ninth Intl. Conference on Radioactive Waste Management and Environmental Remediation*, ASME, S16, 1-6. ☞
- Benson, C. and Chen, C. (2003), Selecting the Thickness of Monolithic Earthen Covers for Waste Containment, *Soil and Rock America 2003*, Verlag Gluck auf GMBH, Germany, 1397-1404. ☞
- Benson, C. (2002), Containment Systems: Lessons Learned from North American Failures, *Environmental Geotechnics (4th ICEG)*, Swets and Zeitlinger, Lisse, 1095-1112. ☞

- Benson, C., Albright, W., Roesler, A., and Abichou, T. (2002), Evaluation of Final Cover Performance: Field Data from the Alternative Cover Assessment Program (ACAP), *Proc. Waste Management '02*, WM Symposia Inc., Tucson, AZ. ↵
- Benson, C. (2001), Waste Containment: Strategies & Performance, *Proc. Geoenvironment 2001*, Australia-New Zealand Geomechanics Society, D. Smith, S. Fytus, & M. Allman, eds., 23-52. ↵
- Benson, C. and Boutwell, G. (2000), Compaction Conditions and Scale-Dependent Hydraulic Conductivity of Compacted Clay Liners, *Constructing and Controlling Compaction of Earth Fills*, ASTM STP 1384, D. Shanklin, K. Rademacher, and J. Talbot, Eds., ASTM, 254-273. ↵
- Benson, C. and Wang, X. (2000), Hydraulic Conductivity Assessment of Hydraulic Barriers Constructed with Paper Sludge, *Geotechnics of High Water Content Materials*, STP 1374, ASTM, T. Edil and P. Fox, Eds., 91-107. ↵
- Benson, C. and Bosscher, P. (1999), Remote Field Methods to Measure Frost Depth, *Field Instrumentation for Soil and Rock*, STP 1358, ASTM, G. Durham and W. Marr, Eds., 267-284. ↵
- Benson, C. and Bosscher, P. (1999), Time-Domain Reflectometry in Geotechnics: A Review, *Nondestructive and Automated Testing for Soil and Rock Properties*, STP 1350, ASTM, W. Marr and C. Fairhurst, Eds., 113-136. ↵
- Benson, C. and Gribb, M. (1997), Measuring Unsaturated Hydraulic Conductivity in the Laboratory and Field, *Unsaturated Soil Engineering Practice*, GSP No. 68, ASCE, S. Houston and D. Fredlund, eds., 113-168. ↵
- Benson, C. and Khire, M. (1995), Earthen Covers for Semi-Arid and Arid Climates, *Landfill Closures*, ASCE, GSP No. 53, J. Dunn and U. Singh, eds., 201-217. ↵
- Benson, C., Tinjum, J., and Hussin, C. (1995), Leakage Rates Through Geomembranes Containing Holes, *Geosynthetics 95*, Industrial Fabrics Assoc. Intl., St. Paul 745-758. ↵
- Benson, C., Hardianto, F., and Motan, E. (1994), Representative Specimen Size for Hydraulic Conductivity of Compacted Soil Liners, *Hydraulic Conductivity and Waste Contaminant Transport in Soils*, STP 1142, ASTM, S. Trautwein and D. Daniel, eds., 3-29. ↵
- Benson, C. and Khire, M. (1993), Soil Reinforcement with Strips of Reclaimed HDPE, *Geosynthetics 93*, Industrial Fabrics Assoc. Intl., St. Paul, 935-948. ↵
- Benson, C. and Charbeneau, R. (1991), Reliability Analysis for Time of Travel in Compacted Soil Liners, *Geotechnical Congress 1991*, ASCE, GSP No. 27, 456-467. ↵
- Bergstrom, W., Creamer, P., Petrusha, H., and Benson, C. (1994), Field Performance of a Double Liner Test Pad, *Geoenvironment 2000*, GSP No. 46, ASCE, 608-623. ↵
- Bosscher, P., Jong, D., and Benson, C. (1998), Software to Establish Seasonal Load Limits for Flexible Pavements, *Cold Regions Impact on Civil Works*, D. Newcomb, ed., ASCE, 731-747. ↵
- Bozyurt, O., Tinjum, J., Son, Y., Edil, T., and Benson, C. (2012), Resilient Modulus of Recycled Asphalt Pavement and Recycled Concrete Aggregate, *State of the Art and Practice in Geotechnical Engineering*, GSP No. 225, R. Hryciw et al., Eds., ASCE, Reston VA, 3901-3910. ↵
- Bradshaw, S., Benson, C., Olenbush, E., and Melton, J. (2010), Using Foundry Sand in Green Infrastructure Construction, *Proc. Green Streets and Highways 2010*, ASCE, 280-298. ↵
- Bradshaw, S., Edil, T., and Benson, C. (2025), Greenhouse Gas Impacts of Harvesting Coal Ash for Cement Replacement in Concrete, *Geoenvironmental Engineering*, GSP No. 362, M. Othman and N. Yesiller, eds., ASCE, Reston, VA, 53-67. ↵
- Breitmeyer, R., Bareither, C., Benson, C., Edil, T., and Barlaz, M. (2008), Field-Scale Lysimeter Experiment to Study Hydrologic and Mechanical Properties of Municipal Solid Waste, *Proceedings, Global Waste Management Symposium 2008*, Penton Media, Orlando, 1-11. ↵
- Breitmeyer, R. and Benson, C. (2011), Measurement of Unsaturated Hydraulic Properties of Municipal Solid Waste, *GeoFrontiers 2011 Advances in Geotechnical Engineering*, GSP No. 211, J. Han and D. Alazamora, eds., ASCE, Reston, VA, 1433-1442. ↵

- Brown, B., Benson, C., Edil, T., and Bradshaw, S. (2016), Water Quality Risk Assessment from Roadway Substructures Employing Fly Ash, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 998-1008. ↗
- Chalermyanont, T. and Benson, C. (2005), Method to Estimate the System Probability of Failure of Mechanically Stabilized Earth (MSE) Walls, *Slopes and Retaining Structures Under Seismic and Static Conditions*, GSP No. 140, M. Gabr et al., eds., ASCE, Reston, VA, 1-15. ↗
- Chamberlain, E., Erickson, A. and Benson, C. (1994), Effects of Frost Action on Compacted Clay Barriers, *Geoenvironment 2000*, ASCE, GSP No. 46, 702-717. ↗
- Chen, J., Chen, Z., Gruber, C., Brown, K., Kosson, D., and Benson, C. (2024), Modeling Pre- and Post-Closure Hydrological Conditions of Waste Tanks at the Hanford Sites, Washington, *Proc. Waste Management 2024*, WM Symposia Inc., 24058, 1-8. ↗
- Chen, J. and Benson, C. (2023), Hydrological Evaluation of Placement Strategies for Disposal of Cementitious Waste Forms, *Proc. Waste Management 2023*, WM Symposia Inc., 23045, 1-14. ↗
- Chen, J. and Benson, C. (2022), Using Hydrological Modeling and Particle Tracking to Identify Monitoring Well Locations Near a LLW Disposal Facility, *Proc. Waste Management 2022*, WM Symposia Inc., 22084, 1-5. ↗
- Chen, J. and Benson, C. (2021), Using Perimeter Subsurface Drains to Control Groundwater Levels Beneath Low-level and Mixed Waste Landfills, *Proc. Waste Management '21*, WM Symposia Inc., Phoenix, AZ. **(Superior Paper Award)** ↗
- Chen, J., Benson, C., and Tian, K. (2020), Modeling Stress-Induced Pore Water Pressures in The Vadose Zone Beneath a Composite-Lined Landfill, *Proc. Waste Management '20*, WM Symposia Inc., Phoenix, AZ. ↗
- Chen, J., Benson, C., Likos, W., and Edil, T. (2017), Interface Shear Strength of a Bentonite-Polymer Geosynthetic Clay Liner and a Textured Geomembrane, *Geotechnical Frontiers 2017, Waste Containment, Barriers, Remediation, and Sustainable Geoengineering*, GSP No. 276, ASCE, T. Brandon and R. Valentine, eds., 219-225. ↗
- Chen, J., Benson, C., and Edil, T. (2015), Hydraulic Conductivity of Geosynthetic Clay Liners to Coal Combustion Product Leachates, *Geosynthetics 2015*, IFAI, St. Paul, MN, 173-180. ↗
- Chen, J., Benson, C., and Tian, K. (2018), Hydraulic Conductivity of Bentonite-Polymer Geosynthetic Clay Liners to Coal Combustion Product Leachates, *Proc. 8th Intl. Conference on Environmental Geotechnics*, Springer Nature, Singapore, L. Zhan et al. (Eds.): 664–671, https://doi.org/10.1007/978-981-13-2224-2_82. ↗
- Chen, J., Bradshaw, S., Benson, C., Tinjum, J., and Edil, T. (2012), pH-Dependent Leaching of Trace Elements from Recycled Concrete Aggregate, *State of the Art and Practice in Geotechnical Engineering*, GSP No. 225, R. Hryciw et al., Eds., ASCE, Reston VA, 3729-3738. ↗
- Chen, J., Bradshaw, S., Likos, W., Benson, C., and Edil, T. (2014), Hydraulic Conductivity of Geosynthetic Clay Liners to Synthetic Coal Combustion Product Leachates, Geo-Characterization and Modeling for Sustainability, *Geotechnical Special Publication No. 234*, ASCE, Reston, VA, 334-342. ↗
- Chen, J., Gustitus, S., and Benson, C. (2021), Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners Permeated with Bauxite Liquor, *Proc. Geosynthetics 2021*, Industrial Fabrics Association International, St. Paul, MN, 254-260. ↗
- Chen, J., Gustitus, S., and Benson, C. (2021), Effect of Polymer Elution on Interface Strength Between Bentonite-Polymer Geosynthetic Clay Liners and Geomembranes, *Third International Symposium on Coupled Phenomena in Environmental Geotechnics*, Japanese Geotechnical Society Special Publication, Vol. 9, Japanese Geotechnical Society, Tokyo, 45-48. ↗

- Chen, J., Gustitus, S., and Benson, C. (2021), Using Bentonite-Polymer Composite Geosynthetic Clay Liners to Contain Coal Combustion Product Leachates, *Proc. Geosynthetics 2021*, Industrial Fabrics Association International, St. Paul, MN, 274-281. ☞
- Davis, M., Benson, C., and Roberts, H. (2017), Constructing a Cover Performance Test Section on a Uranium Mill Tailings Management Cell, *Proc. Tailings and Mine Waste*, University of Alberta, 365-376. ☞
- Demirkanli, I., Bence, R., Rockhold, M., Johnson, C., Mangel, A., Morse, M., Holbrook, D., Benson, C., and Denny, A. (2024), Soil Water Balance Model Selection and Benchmark Tests for Evaluating Uranium Mill Tailings Disposal Cell Evapotranspiration Covers, *Proc. Waste Management 2024*, WM Symposia Inc., 24624, 1-15. **(Superior Paper Award)** ☞
- Dingrando, J., Edil, T., and Benson, C. (2004), Beneficial Reuse of Foundry Sands in Controlled Low Strength Material, *Innovations in Controlled Low-Strength Material (Flowable Fill)*, STP 1459, J. Hitch, A. Howard, and W. Bass, eds., ASTM, West Conshohocken, PA. ☞
- Edil, T. and Benson, C. (1998), Geotechnics of Industrial Byproducts, *Recycled Materials in Geotechnical Applications*, GSP No. 79, ASCE, C. Vipulanandan and D. Elton, eds., 1-18. ☞
- Elder, C., Benson, C., and Eykholt, G. (1997), A Model for Predicting Mass Removal During Air Sparging, *In Situ Remediation of the Geoenvironment*, GSP No. 71, J. Evans, ed., ASCE, Reston, VA, 83-97. ☞
- Eun, J., Yilmaz, M., Tinjum, T., and Benson, C. (2017), Temperature Effect on the Transport of VOCs in a Co-extruded EVOH Geomembrane, *Geotechnical Frontiers 2017, Waste Containment, Barriers, Remediation, and Sustainable Geoengineering*, GSP No. 276, ASCE, T. Brandon and R. Valentine, eds., 302-312. ☞
- Eun, J., Yilmaz, M., Tinjum, J., and Benson, C. (2016), Hydrogen Sulfide Transport Through Simulated Interim Covers with Conventional and Co-Extruded Ethylene-Vinyl Alcohol Geomembranes, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 51-61. ☞
- Foose, G., Benson, C., and Edil, T. (1999), Equivalency of Composite Geosynthetic Clay Liners as a Barrier to Volatile Organic Compounds, *Geosynthetics 99*, Industrial Fabrics Association International, St. Paul, MN, 321-334. ☞
- Foose, G., Benson, C., and Edil, T. (1996), Evaluating the Effectiveness of Landfill Liners, *Proc. 2nd Intl. Conference on Environmental Geotechnics*, Osaka, Japan, 217-221.
- Geng, W., Likos, W., Benson, C. (2016), Viscosity of Polymer-Modified Bentonite as a Hydraulic Performance Index, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 498-508. ☞
- Gustitus, S. and Benson, C. (2020), Assessing Polymer Elution and Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners Permeated with Aggressive Solutions, *Proc. GeoAmericas 2020*, April 26-29, 2020, Rio De Janeiro, Brazil. ☞
- Gustitus, S. and Benson, C. (2021), Flow-Swell Index as an Indicator of Chemical Compatibility of Bentonite-Polymer Composite Geosynthetic Clay Liners, *Proc. Geosynthetics 2021*, Industrial Fabrics Association International, St. Paul, MN, 282-292. ☞
- Gustitus, S. and Benson, C. (2023), Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners Under Elevated Temperature and Extreme pH, *Proc. Geosynthetics 2023*, Advanced Textiles Association, Rosemont, MN, 549-560. ☞
- Hou, J., Gustitus, S., and Benson, C. (2022), Pore-Scale Modeling of Polymer Clogging in Bentonite-Polymer Composite Geosynthetic Clay Liners, *Geo-Congress 2022, Soil Improvement, Geosynthetics, and Innovative Geomaterials*, ASCE, GSP No. 331, A. Lemnitzer and A. Stuedlein, eds., 597-604. ☞
- Hou, J., Xing, X., and Benson, C. (2023), Thermo-Hydro-Mechanical Shear Behavior of Interfaces Between a Textured Geomembrane and Geosynthetic Clay Liner, *Geo-Congress 2023, Foundations*,

- Retaining Structures, and Geosynthetics*, ASCE, GSP No. 341, E. Rathje, B. Montoya, and M. Wayne, eds., 545-553. ↵
- Hou, J., Chu, C., and Benson, C. (2024), Evaluating the Impact of Bentonite Granule Size Distribution and Swelling on the Hydraulic Conductivity of Geosynthetic Clay Liners, *Proc. GeoAmericas 2024*, E3S Web of Conferences, 569, 14003, 11 p. ↵
- Hunter, E., Tinjum, J., and Benson, C. (2014), Radionuclide Behavior in Low-Level Radioactive Waste (LLW) Disposal Barrier Materials: Impacts of Sorption, *Geo-Congress 2014, Geo-Characterization and Modeling for Sustainability*, ASCE, GSP No. 234, M. Abu-Farsakh, X. Yu, Ph.D., and L. Hoyos, eds., 1929-1930. ↵
- Khire, M., Benson, C., and Bosscher, P. (1997), Water Balance of Two Earthen Landfill Caps in a Semi-Arid Climate, *Intl. Containment Tech.*, 252-261. ↵
- Khire, M., Meerdink, J., Benson, C., and Bosscher, P. (1995), Unsaturated Hydraulic Conductivity and Water Balance Predictions for Earthen Landfill Final Covers, *Soil Suction Applications in Geotechnical Engineering Practice*, ASCE, GSP No. 48, W. Wray and S. Houston, eds., 38-57. ↵
- Komonweeraket, K., Benson, C., Edil, T., and Bleam, W. (2011), Leaching Behavior and Mechanisms Controlling the Release of Elements from Soil Stabilized with Fly Ash, *GeoFrontiers 2011 Advances in Geotechnical Engineering*, GSP No. 211, J. Han and D. Alazamora, eds., ASCE, Reston, VA, 1101-1110. ↵
- Kootstra, B., Ebrahimi, A., Edil, T., and Benson, C. (2010), Plastic Deformation of Recycled Base Materials, *GeoFlorida 2010, Advances in Analysis, Modeling, and Design*, Geotechnical Special Publication No. 199, D. Fratta, A. Puppula, and B. Muhunthan, eds., ASCE, Reston, VA, 2682-2691. ↵
- Koragappa, N., Wall, R., and Benson, C. (2008), Water Balance Cover – Case Study of a Southern California Landfill, *Proceedings, Global Waste Management Symposium 2008*, Penton Media, Orlando, 1-15.
- Lee, J., Bradshaw, S., Edil, T., and Benson, C. (2010), Green Benefits of Using Coal Ashes for Subgrade Stabilization During Road Construction, *Proc. Second Intl. Conference on Sustainable Construction Materials and Technologies*, Università Politecnica delle Marche, Ancona, Italy. ↵
- Lee, J., Edil, T., Benson, C., and Tinjum, J. (2010), Use of BE²ST-in-Highways for Green Highway Construction in Wisconsin, *Proc. Green Streets and Highways 2010*, ASCE, 480-494. ↵
- Li, L and Benson, C. (2005), Impact of Fouling on the Long-Term Hydraulic Behavior of Permeable Reactive Barriers, *Permeable Reactive Barriers*, Publication 298, International Assoc. of Hydrological Sciences, Oxfordshire, UK, G. Boshoff and B. Bone, eds., 23-32. ↵
- Li, L., Benson, C., Edil, T., and Hatipoglu, B. (2006), WiscLEACH: A Model for Predicting Ground Water Impacts from Fly-Ash Stabilized Layers in Roadways, *Geotechnical Engineering in the Information Technology Age*, D. DeGroot, J. DeJong, J. Frost, and L. Baise, eds., ASCE. ↵
- Li, L., Mergener, E., and Benson, C. (2003), Reactive Transport Modeling of Mineral Fouling in Permeable Reactive Barriers, *Proc. MODFLOW and More 2003: Understanding through Modeling*, International Groundwater Modeling Center, Golden, CO, 300-304. ↵
- Lin, H., Chen, J., Benson, C., and Clark, B. (2020), Sorption of Anionic Iodine and Molybdenum to Multisorbing Barrier (MSB) Materials, *Proc. Waste Management '20*, Phoenix, AZ. ↵
- Malusis, M. and Benson, C. (2006), Lysimeters versus Water-Content Sensors for Performance Monitoring of Alternative Earthen Final Covers, *Unsaturated Soils 2006*, ASCE Geotechnical Special Publication No. 147, 1, 741-752. ↵
- Manassero, M., Benson, C., and Bouazza, M. (2000), Solid Waste Containment Systems, *Proc. GeoEng2000*, Melbourne, Australia, Technomic Publishing Company, Lancaster, PA, USA, 520-642. ↵

- Metz, S. and Benson, C. (2007), Iron Foundry Slags as Permeable Reactive Barrier Materials for Removing Arsenic from Groundwater, *Geoenvironmental Engineering*, Geotechnical Special Publication 163, ASCE, Reston, VA, 1-11. ↵
- Nokkaew, K., Tinjum, J., and Benson, C. (2012), Hydraulic Properties of Recycled Asphalt Pavement and Recycled Concrete Aggregate, *State of the Art and Practice in Geotechnical Engineering*, GSP No. 225, R. Hryciw et al., Eds., ASCE, Reston VA, 1476-1485. ↵
- Norris, A., Scalia, J., Benson, C., and Shackelford, C. (2024), Review of Methods for Quantifying Polymer Loading of Enhanced-Bentonite Geosynthetic Clay Liners, *Geosynthetics: Leading the Way to a Resilient Planet*, *Proc. 12th International Conference on Geosynthetics*, G. Biondi, et al., eds., CRC Press/Balkema, Boca Raton, FL, 1479-1484. ↵
- O'Donnell, J., Benson, C., and Edil, T. (2010), Trace Element Leaching from Pavements with Fly Ash-Stabilized Bases and Subgrades: Experience in the Midwestern United States, *Proc. Second Intl. Conference on Sustainable Construction Materials and Technologies*, Università Politecnica delle Marche, Ancona, Italy.
- O'Donnell, J., Benson, C., Edil, T., and Bradshaw, S. (2011), Leaching of Trace Elements from Pavement Materials Stabilized with Fly Ash, *Proc. Green Streets and Highways 2010*, ASCE, Reston, VA, 272-279. ↵
- Ogorzalek, A., Shackelford, C., and Benson, C. (2005). Comparison of Model Predictions and Field Data for an Alternative Cover in a Semiarid Climate, *Symp. on Mines and the Environment*, Canadian Institute of Mining, Metallurgy, and Petroleum, Montreal, Quebec, 666-680.
- Othman, M., Benson, C., Chamberlain, E., and Zimmie, T. (1994), Laboratory Testing to Evaluate Changes in Hydraulic Conductivity Caused by Freeze-Thaw: State-of-the-Art, *Hydraulic Conductivity and Waste Containment Transport in Soils*, STP 1142, ASTM, S. Trautwein and D. Daniel, eds., 227-254. ↵
- Padgett, J., Breitmeyer, R., Bareither, C., Barlaz, M., and Benson, C. (2008). Biodegradability of Forest Products Under Laboratory and Bioreactor Landfill Conditions, *Proceedings, Global Waste Management Symposium 2008*, Penton Media, Orlando, 1-6.
- Rauen, T. and Benson, C. (2008), Hydraulic Conductivity of a Geosynthetic Clay Liner Permeated with Leachate from a Landfill with Leachate Recirculation, *GeoAmericas 2008*, International Geosynthetics Society. ↵
- Rowe, R. et al. (2022), Protecting the Environment from Contamination with Barrier Systems: Advances and Challenges, *Proc. 20th International Conference on Soil Mechanics and Geotechnical Engineering*, Balkema, Rotterdam, 1-108. ↵
- Salihoglu, H., Chen, J., Likos, W., and Benson, C. (2016), Hydraulic Conductivity of Bentonite-Polymer Geosynthetic Clay Liners in Coal Combustion Product Leachates, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 438-448. ↵
- Santos, M., Chen, J., Gruber, C., van der Sloot, H., Brown, K., Kosson, D., and Benson, C. (2025), Hydrological Evaluation for Disposal of Glass Waste Forms at the Hanford Site, Washington, Washington, *Proc. Waste Management 2024*, WM Symposia Inc., 25113, 1-8. **(Superior Paper Award)** ↵
- Sawangsurriya, A., Edil, T., Benson, C. and Wang, X., A Simple Setup for Inducing Matric Suction, *Third Asian Conference on Unsaturated Soils*, 2007, Nanjing, China. ↵
- Sawangsurriya, A., Benson, C., And Wang, X. (2010), Issues for Calibration of Thermal Dissipation Sensors for Measuring Matric Suction, *Unsaturated Soils*, Buzzi, O., Fityus, S., And Sheng, D., Eds. Taylor And Francis, London, 209-214. ↵

- Scalia, J., Benson, C., Edil, T., Bohnhoff, G., and Shackelford, C. (2011), Geosynthetic Clay Liners Containing Bentonite Polymer Nanocomposite, *GeoFrontiers 2011 Advances in Geotechnical Engineering*, GSP No. 211, J. Han and D. Alazamora, eds., ASCE, Reston, VA, 2001-2009. ☞
- Scalia, J. and Benson, C. (2016), Evaluation of Na-Bentonite-Polyacrylate Mixtures to Enhance the Chemical Resistance of Geosynthetic Clay Liners, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 388-398. ☞
- Scalia, J. and Benson, C. (2014), Barrier Performance of Bentonite-Polyacrylate Nanocomposite to Artificial Ocean Water, *Proc. Geo-Congress 2014, Geo-Characterization and Modeling for Sustainability*, ASCE, GSP 234, M. Abu-Farsakh, X. Yu, and L. Hoyos, eds., 1826-1835. ☞
- Schlicht, P., Benson, C., Tinjum, J., and Albright, W. (2010), In-Service Hydraulic Properties of Two Landfill Final Covers in Northern California, *GeoFlorida 2010, Advances in Analysis, Modeling, and Design*, Geotechnical Special Publication No. 199, D. Fratta, A. Puppula, and B. Muhunthan, eds., ASCE, Reston, VA, 2867-2877. ☞
- Shackelford, C. and Benson, C. (2006), Selected Factors Affecting Water-Balance Predictions for Alternative Covers Using Unsaturated Flow Models, *Geotechnical Engineering in the Information Technology Age*, D. DeGroot, J. DeJong, J. Frost, and L. Baise, eds., ASCE. ☞
- Smesrud, J., Benson, C., Albright, W., Richards, J., Wright, S., Israel, T., and Goodrich, K. (2008), Lessons Learned from an Alternative Cover Pilot Test in Northern California, *Proceedings, Global Waste Management Symposium 2008*, Penton Media, Orlando, 1-20. ☞
- Somasundaram, S., Shenthann, T., Benson, C., and Nannapaneni, S. (2010), Unsaturated Hydraulic Characteristics of Soil with Significant Oversize Particles, *Proc. Fifth Intl. Conference on Unsaturated Soils*, CRC Press, Boca Raton, FL, 494-500. ☞
- Stefani, N., Likos, W., and Benson, C. (2016), Evaluation of Two Methods for Measuring Radon Flux from Earthen Radon Barriers, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 145-155. ☞
- Tachavises, C. and Benson, C. (1997), Flow Rates Through Earthen, Geomembrane, and Composite Cut-off Walls, *Intl. Containment Tech.*, 945-953. ☞
- Tachavises, C. and Benson, C. (1997), Hydraulic Importance of Defects in Vertical Groundwater Cutoff Walls, *In Situ Remediation of the Geoenvironment*, GSP No. 71, J. Evans, ed., ASCE, Reston, VA, 168-180. ☞
- Tan, Y., Basantis, A., Benson, C., and Chen, J. (2022), Hydraulic Properties of Sluiced Coal Combustion Products Disposed in Impoundments, *Geo-Congress 2022: Geoenvironmental Engineering; Unsaturated Soils; and Contemporary Topics in Erosion, Sustainability, and Coal Combustion Residuals*, ASCE, GSP No. 335, A. Lemnitzer and A. Stuedlein, eds., 505-513. ☞
- Tan, Y., Benson, C., Zhang, H. (2022), Interactions Between Geosynthetic Clay Liners and Concrete in Low-Level Radioactive Waste Disposal Facilities, *Proc. Waste Management '22, WM Symposia Inc.*, 22337, 1-7. ☞
- Tan, Y., Chen, J., Benson, C. (2022), Predicting Hydraulic Conductivity of Geosynthetic Clay Liners Using a Neural Network Algorithm, *Geo-Congress 2022: Geoenvironmental Engineering; Unsaturated Soils; and Contemporary Topics in Erosion, Sustainability, and Coal Combustion Residuals*, ASCE, GSP No. 335, A. Lemnitzer and A. Stuedlein, eds., 21-28. ☞
- Tan, Y., and Benson, C. (2023), Effectiveness of Composite Liners in Containing PFAS, *Proc. Waste Management '23*, Phoenix, AZ, 23292, 1-7. ☞
- Tan, Y., Benson, C., Zhou, G., Bradshaw, S., and Edil, T. (2024), Hydraulic Conductivity of Two Geosynthetic Clay Liners with Different Bentonite Granule Sizes, *Proc. GeoAmericas 2024*, E3S Web of Conferences, 569, 14001, 10 p. ☞

- Tan, Y. and Benson, C. (2025), Evaluating Diffusion of Per- and Polyfluoroalkyl Substances through Composite Liners, *Geoenvironmental Engineering*, GSP No. 362, M. Othman and N. Yesiller, eds., ASCE, Reston, VA, 127-137. ↗
- Tanyu, B., Kim, W., Edil, T., and Benson, C. (2003), Comparison of Laboratory Resilient Modulus with Back-Calculated Elastic Moduli from Large-Scale Model Experiments and FWD Tests on Granular Materials, *Resilient Modulus Testing for Pavement Components*, STP 1437, G. Durham, A. Marr, and W. De Groff, eds., ASTM, West Conshohocken, PA, 191-208. ↗
- Tatliso, N., Benson, C., and Edil, T. (1997), Effect of Fines on the Mechanical Properties of Soil-Tire Chip Mixtures, *Testing Soil Mixed with Waste or Recycled Materials*, STP 1275, ASTM, M. Wasemiller and K. Hoddinott, eds., 93-108. ↗
- Tian, K. and Benson, C. (2014), Hydraulic Conductivity of Geosynthetic Clay Liners Exposed to Low-Level Radioactive Waste Leachate, *Proceedings Waste Management '14*, WM Symposia Inc., Phoenix, AZ, 1-15. ↗
- Tian, K. and Benson, C. (2015), Effect of Low-Level Radioactive Waste Leachate on Hydraulic Conductivity of a Geosynthetic Clay Liner, *Geosynthetics 2015*, IFAI, St. Paul, MN, 236-244. ↗
- Tian, K. and Benson, C., Yang, Y., and Tinjum, J. (2016), Effect of Radiation from Low-Level Radioactive Waste Leachate on Antioxidant Depletion in HDPE Geomembranes, Paper No. 16087, *Proceedings Waste Management '16*, WM Symposia Inc., Phoenix, AZ, 1-10. ↗
- Tian, K., Benson, C., and Likos, W. (2017), Effect of an Anion Ratio on the Hydraulic Conductivity of a Bentonite-Polymer Geosynthetic Clay Liner, *Geotechnical Frontiers 2017, Waste Containment, Barriers, Remediation, and Sustainable Geoengineering*, GSP No. 276, ASCE, T. Brandon and R. Valentine, eds., 180-189. ↗
- Tian, K. and Benson, C. (2018), Containing Bauxite Liquor Using Bentonite-Polymer Composite Geosynthetic Clay Liners, *Proc. 8th Intl. Conference on Environmental Geotechnics*, Springer Nature, Singapore, L. Zhan et al. (Eds.): 672-678. ↗
- Tian, K. and Benson, C. (2018), Containing Tc-99 Using a Multisorbing Barrier Material, *Proceedings Waste Management '18*, WM Symposia Inc., Phoenix, AZ, 1-6. ↗
- Tian, K., Benson, C., Yesiller, N., and Hanson, J. (2019), Evaluation of a HDPE Geomembrane from a Composite Liner After 12 Years of Atmospheric Exposure, *Geosynthetics 2019*, Industrial Fabrics Association International, St. Paul, MN, 522-527. ↗
- Tian, K., Likos, W., and Benson, C. (2016), Pore-Scale Imaging of Polymer-Modified Bentonite in Saline Solutions, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 468-478. ↗
- Tian, K., Tinjum, J., Benson, C., and Edil, T. (2014) Antioxidant Depletion in HDPE Geomembranes Exposed to Low-Level Radioactive Waste Leachate. *Geo-Congress 2014*, 1816-1825, doi: 10.1061/9780784413272.1781-15. ↗
- Trzebiatowski, B., Edil, T., and Benson, C. (2004), Case Study of Subgrade Stabilization Using Fly Ash: State Highway 32, Port Washington, Wisconsin, *Beneficial Reuse of Waste Materials in Geotechnical and Transportation Applications*, GSP No. 127, A. Aydilek and J. Wartman, eds., ASCE, Reston, VA, 123-136. ↗
- Vasko, S., Jo, H., Benson, C., Edil, T., and Katsumi, T. (2001), Hydraulic Conductivity of Partially Prehydrated Geosynthetic Clay Liners Permeated with Aqueous Calcium Chloride Solutions, *Geosynthetics 2001*, Industrial Fabrics Assoc. International, St. Paul, MN, 685-699. ↗
- Wang, X. and Benson, C. (2016), Constant-Head Constant-Volume Hydraulic Conductivity Testing of Porous Materials, *Proc. Geoenvironmental Engineering: Honoring David E. Daniel*, ASCE, GSP 274, C. Benson and C. Shackelford, eds., 69-79. ↗

- Waugh, W., Benson, C., and Albright, W. (2008), Monitoring the Performance of an Alternative Landfill Cover Using a Large Embedded Lysimeter, *Proceedings, Global Waste Management Symposium 2008*, Penton Media, Orlando, 1-10. ↗
- Waugh, W., Benson, C., and Albright, W. (2009), Sustainable Covers for Uranium Mill Tailings, USA: Alternative Design, Performance, and Renovation, *Proc. 12th Intl. Conference on Environmental Remediation and Radioactive Waste Management*, ICEM2009, ASME, 11-15 October 2009, Liverpool, UK. ↗
- Williams, M., Fuhrmann, M., Stefani, N., Michaud, A., Likos, W., Benson, C., and Waugh, W. (2024), Uranium Mill Tailings Radiation Control Act Cover Performance After Nearly 20 Years of Service, *Proc. Waste Management 2024*, WM Symposia Inc., 24621, 1-8. **(Superior Paper Award)** ↗
- Williams, T., Benson, C., Tian, K., Yesiller, N., and Hanson, J., (2018), Hydraulic Conductivity of a Geosynthetic Clay Liner (GCL) from a Composite Liner after 12-yr of Atmospheric Exposure, *Proc. 11th Intl. Conference on Geosynthetics*, IGS, 16-21 Sept. 2018, Seoul, Korea, 1-7. ↗
- Worthy, R., Abkowitz, M., Clarke, J., and Benson, C. (2011), Analysis of Modeling Capabilities to Predict Disposal Facility Cover Design and Performance at DOE Sites, *Proc. Waste Management '11*, WM Symposia Inc., Phoenix, AZ. ↗
- Wright, S., Arcement, B., and Benson, C. (2003), Comparison of Maximum Density of Cohesionless Soils Determined Using Vibratory and Impact Compaction Methods, *Soil and Rock America 2003*, Verlag Gluck auf GMBH, Essen, Germany, 1709-1716. ↗
- Yilmaz, M., Olson, R., Tan, Y., Benson, C., Edil, T., and Bradshaw, S. (2023), Characteristics of Black Goo From Leachate Collection Systems at Two North American Landfills, *Proc. 9th International Congress on Environmental Geotechnics*, Vol. 3., Volume 3, T. Baser et al., ed., International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE), 26-30. ↗
- Zhu, J., Tan, Y., Benson, C., Youngblood, J., Bradshaw, S., and Edil, T. (2024), Using Viscosity as an Index for Polymer Loading of Bentonite-Polymer Composite Geosynthetic Clay Liners, *Proc. GeoAmericas 2024*, E3S Web of Conferences, 569, 14002, 9 p. ↗

Books

- Albright, W., Benson, C., and Waugh, W. (2010), *Water Balance Covers for Waste Containment: Principles and Practice*, ASCE Press, Reston, VA, 158 p. ↗

Chapters in Books & Other Periodicals

- Benson, C. (2005), Materials Stability and Applications, in *Barrier Systems for Environmental Contaminant Containment and Treatment*, C. Chen, H. Inyang, and L. Everett, eds., CRC Press, Boca Raton, FL, 143-208.
- Benson, C. and Scalia, J. (2010), Chapter 10: Hydrologic Performance of Final Covers Containing GCLs, in *Geosynthetic Clay Liners for Waste Containment Facilities*, A. Bouazza and J. Bowders, eds., CRC Press, Boca Raton, FL, 203-211. ↗
- Doyle, M., Lee, S., Benson, C., and Pariza, M. (2010), Decontamination and Disposal of Contaminated Foods, *Wiley Handbook of Science and Technology for Homeland Security*, J. Voeller, ed., John Wiley and Sons, NY, 1-15. ↗
- Li, L. and Benson, C. (2005), Reactive Transport in the Saturated Zone: Case Histories for Permeable Reactive Barriers, *Water Encyclopedia, Volume I – Ground Water*, J. Lehr and J. Keeley, eds., John Wiley, 518-524.

Non-Refereed Conference Papers

- Abichou, T., Albright, W., and Benson, C., (2003). Field Tests of Conventional and Alternative Final Cover Systems for Landfill Final Covers. *SWANA WASTECON 2003 Proc.*, 143-158.

- Abichou, T., Edil, T., Benson, C., Berilgen, M. (2002), Mass Behavior of Soil-Tire Chip Backfills, *Beneficial Use of Recycled Materials in Transportation Applications*, Air and Waste Management Association, Sewickley, PA, 689-698. ☞
- Abu-Hassanein, Z. and Benson, C. (1994), Using Electrical Resistivity for Compaction Control of Compacted Soil Liners, *Proc. Tailings and Mine Waste '94*, Jan. 19-21, Ft. Collins, CO, 177-189. ☞
- Albright, W., Benson, C., Gee, G., Rock, S., and Abichou, T. (2001), Tests of Alternative Final Landfill Covers in Arid and Semi-Arid Areas Using Innovative Water Balance Monitoring Systems, *Proc. 36th Annual Engineering Geology & Geotechnical Engineering Symp.*, 33-41.
- Albright, W., Benson, C., Gee, G., and Rock, S. (2000), Tests of Alternative Final Landfill Covers Using Innovative Water Balance Monitoring Systems, *Proc. Geological Society of America Annual Meeting*, Reno, Nevada, 32(7), 126. ☞
- Benson, C., Edil, T., Bin-Shafique, S. (2007), Leaching of Trace Elements from Soils Stabilized with Coal Fly Ash, *Proc. Flue Gas Desulphurization Byproducts at Coal Mines*, K. Vories and A. Harrington, Eds., US Dept. of Interior Office of Surface Mining Coal Research Center, Carbondale, IL, 101-111. ☞
- Benson, C. (2005), General Report on Technical Session 3a: Waste Disposal and Management, *Proc. 16th Intl. Conference on Soil Mechanics and Geotechnical Engineering*, Japanese Geotechnical Society, Tokyo, 179-185.
- Benson, C., Bohnhoff, G., Apiwantragoon, P., Ogorzalek, A., Shackelford, C., and Albright, W. (2004), Comparison of Model Predictions and Field Data for an ET Cover, *Tailings and Mine Waste '04*, Balkema, Leiden, Netherlands, 137-142. ☞
- Benson, C. (2000), Liners and Covers for Waste Containment, *Proc. Fourth Kansai Intl. Geotechnical Forum, Creation of a New Geo-Environment*, Japanese Geotechnical Society, Kyoto, Japan, 1-40. ☞
- Benson, C. (1999), Final Covers for Waste Containment Systems: A North American Perspective, *Proc. XVII Conference of Geotechnics of Torino, Control and Management of Subsoil Pollutants*, Italian Geotechnical Society, Torino, Italy, 1-32. ☞
- Benson, C. (1999), Environmental Geotechnics in the New Millennium, *Geotechnics for Developing Africa*, G. Wardle, G. Blight, and A. Fourie, Eds., Balkema, Rotterdam, 9-22. ☞
- Benson, C. and Khire, M. (1997), Earthen Materials in Surface Barriers, *Barrier Technologies for Environmental Management*, National Academy Press, National Research Council, D79-D89. ☞
- Benson, C., Olson, M., and Bergstrom, W. (1995), Field Evaluation of Five Landfill Liner Insulations, *Proc. Eighteenth Intl. Madison Waste Conference*, Sept. 23-24, Madison, WI, 309-318. ☞
- Benson, C. (1994), Research Developments in Clay Liner Construction, *Proc. 32nd Annual Intl. Solid Waste Exposition*, Solid Waste Association of North America, Silver Spring, MD, 81-93. ☞
- Benson, C., Chamberlain, E., and A. Erickson (1994), Methods for Assessing Freeze-Thaw Damage in Compacted Soil Liners, *Proc. Seventeenth Intl. Madison Waste Conference*, Madison, WI, Sept. 21-22, 185-197. ☞
- Brown, B., Bradshaw, S., Edil, T., and Benson, C. (2015), Leaching from Roadways Stabilized with Fly Ash: Data Assessment and Synthesis, *Proc., World of Coal Ash (WOCA) Conference*, Center for Applied Energy Research, University of Kentucky, Louisville, 1-10. ☞
- Bohnhoff, G., Shackelford, C., Malusis, M., Scalia, J., Benson, C., Edil, T., Di Emiddio, G., Katsumi, T., and Mazzieri, F. (2013), Novel Bentonites for Containment Barrier Applications, *Proc., 18th Intl. Conference on Soil Mechanics and Geotechnical Engineering-Challenges and Innovations in Geotechnics*, P. Delage et al., eds., Presses des Ponts, Paris, 2997-3000. ☞
- Christman, M., Edil, T., and Benson, C. (1999), Characterization of Well Seals Using an Ultrasonic Method, *Proc. Symp. On Application of Geophysics to Engineering and Environmental Problems*, Environmental and Engineering Geophysics Society, Wheat Ridge, CO, 879-888. ☞

- Benson, C. and Boutwell, G. (1992), Compaction Control and Scale-Dependent Hydraulic Conductivity of Clay Liners, *Proc. of the 15th Intl. Madison Waste Conference*, Madison, WI, Sept. 23-24, 62-83. ☞
- Benson, C., Hardianto, F., Motan, E., and Mussatti, D. (1992), Comparison of Laboratory and In Situ Hydraulic Conductivity Tests on a Full-Scale Test Pad, *Mediterranean Conference on Environmental Geotech.*, Cesme, Turkey, May 25-27, 219-228. ☞
- Benson, C. and Othman, M. (1991), Geotechnical Characteristics of Compacted Municipal Solid Waste Compost, *Proc. of the 34th Annual Meeting of the Association of Engineering Geologists*, Sept. 30-Oct. 4, Chicago, IL, 683-691. ☞
- Benson, C. (1991), Predicting Excursions beyond Regulatory Thresholds of Hydraulic Conductivity Using Quality Control Measurements, *Proc. of the First Canadian Conference on Environmental Geotechnics*, Montreal, May 14-17, 447-454. ☞
- Benson, C. (1990), A Minimum Thickness of Compacted Soil Liners, *of the 13th Annual Madison Waste Conference*, Madison, WI, September 19-20, 395-422. ☞
- Benson, C. (1989), Index Tests for Evaluating the Effect of Leachate on a Soil Liner, *Proc. Second Intl. Symposium on Environmental Geotechnology*, Shanghai, China, 222-228. ☞
- Benson, C., Charbeneau, R., and Daniel, D. (1988), Reliability of Compacted Soil Liners, *Proc. of the National Conference on Hydraulic Engineering*, ASCE, Colorado Springs, Colorado, 564-569. ☞
- Elder, C., Benson, C., Eykholt, G. (2001), Economic and Performance Based Design of Monitoring Systems for PRBs, *Proc. 2001 Intl. Containment and Remediation Conference*, Institute for International Cooperative Environmental Research, Florida State University, Tallahassee, FL, USA, 1-5. ☞
- Erickson, A., Chamberlain, E., and Benson, C. (1994), Effects of Frost Action on Covers and Liners in Cold Environments, *Proc. Seventeenth Intl. Madison Waste Conference*, Madison, WI, Sept. 21-22, 198-220. ☞
- Foose, G., Tachavises, C., Benson, C., and Edil, T. (1998), Analyzing Geoenvironmental Engineering Problems with MODFLOW, *Proc. MODFLOW '98*, Colorado School of Mines, Golden, CO, 1, 81-88. ☞
- Gibson, S., Benson, C., and Edil, T. (1999), Assessing Exploratory Borehole Seals with Electrical Geophysical Techniques, *Proc. Symp. On Application of Geophysics to Engineering and Environmental Problems*, Environmental and Engineering Geophysics Society, Wheat Ridge, CO, 869-878. ☞
- Gulec, S., Benson, C., and Edil, T. (2003), Effects of Acid Mine Drainage (AMD) on the Engineering Properties of Geosynthetics, *Tailings and Mine Waste '03*, Swets & Zeitlinger, Lisse, 173-179. ☞
- Hardianto, F. and Benson, C. (1993), Effect of Specimen Size on Hydraulic Conductivity Measurement of Compacted Soil Liners, *Proceedings ASCE Annual Florida Section Meeting*, Sept. 9-11, Orlando, 1-12. ☞
- Hill, T. and Benson, C. (1999), Hydraulic Conductivity of Compacted Mine Rock Backfill, *Tailings and Mine Waste '99*, Balkema, Rotterdam, 373-379. ☞
- Jo, H., Benson, C., and Edil, T. (2004). Long-Term Hydraulic Conductivity and Cation Exchange of a Geosynthetic Clay Liner (GCL) Permeated with Inorganic Salt Solutions, *Proc. 2004 Annual Conference, Korean Society of Soil and Groundwater Environment*, Jeonju, Korea, 59-62. ☞
- Katsumi, T., Ogawa, A., Numata, S., Benson, C., Kolstad, D., Jo, H., Edil, T., and Fukagawa, R. (2002), Geosynthetic Clay Liners Against Inorganic Chemical Solutions, *Proc. Second Japan-Korea Joint Seminar on Geoenvironmental Engineering*, Kyoto University, Japan, 27-32. ☞
- Katsumi, T., Benson, C., Foote, G., and Kamon, M. (1999), Calculating Chemical Leakage from Landfill Bottom Liners, *Proc. 34th Annual Conference*, Japanese Geotechnical Society, Tokyo.
- Katsumi, T., Benson, C., Jo, H., and Edil, T. (1999), Hydraulic Conductivity of GCLs Permeated with Chemical Solutions, *Proc. 54th Annual Conference*, Japanese Society of Civil Engineers, Tokyo.

- Katsumi, T., Benson, C., Foose, G., and Kamon, M. (1999), Performance-Based Method for Analyzing Landfill Liners, *Geoenvironmental Engineering*, R. Yong and H. Thomas, Eds., British Geotechnical Society, Thomas Telford Publishers, London, 21-28. ☞
- Khire, M., Benson, C., Bosscher, P., and Pliska, R. (1994), Field-Scale Comparison of Capillary and Resistive Landfill Covers in an Arid Climate, *Proc. 14th Annual Hydrology Days*, Fort Collins, CO, 195-209. ☞
- Kim, H. and Benson, C. (1999), Oxygen Transport Through Multilayer Composite Caps Over Mine Waste, *Proc. Sudbury '99 - Mining and the Environment II*, Centre in Mining and Mining Environment Research, Laurentian University, Sudbury, Ontario. ☞
- Kumthekar, U., Chiou, J., Prochaska, M., and Benson, C. (2002), Development of Long-Term Monitoring System to Evaluate Cover System Performance, *Proc. Waste Management '02*, WM Symposia Inc., Tucson, AZ. ☞
- Kumthekar, U., Chiou, J., Prochaska, M., and Benson, C. (2002), Development of Long-Term Monitoring System to Monitor Cover System Conditions, *Spectrum 2002, 9th Biennial Intl. Conference On Nuclear & Hazardous Waste Management*, Reno, Nevada. ☞
- Lane, D., Benson, C., Bosscher, P., and Pliska, R. (1992), Construction and Hydrologic Observations of Three Instrumented Final Covers, *Proc. 15th Intl. Madison Waste Conference*, Madison, Sept. 23-24, 231-250. ☞
- Miller, E., Bahia, H., Benson, C., Khatri A., and Braham, A. (2001), Utilization of Waste Foundry Sand in Hot Mix Asphalt Mixtures, *American Foundry Society Transactions*, 103(1), 1393-1407. ☞
- Motan, E., Benson, C., and Edil, T. (1997), Shear Strength of Municipal Solid Waste, *Proc. WasteTech '97*, National Solid Waste Management Assoc., Washington, DC. ☞
- Ogorzalek, A., Shackelford, C., and Benson, C. (2005). Comparison of Model Predictions and Field Data for an Alternative Cover in a Semiarid Climate. *Symposium on Mines and the Environment*, Rouyn-Noranda, Quebec, Canada, May 15-18, 2005.
- Othman, M. and Benson, C. (1991), Influence of Freeze-Thaw on the Hydraulic Conductivity of a Compacted Clay, *Proc. of the 14th Annual Madison Waste Conference*, Madison, WI, Sept. 25-26, 296-312. ☞
- Rashad, S. and Benson, C. (1994), Improving Subsurface Characterization and Prediction of Contaminant Transport, *Proc., ASCE Annual Hydraulic Engineering Conference*, 277-281. ☞
- Senol, A., Bin-Shafique, M., Edil, T., and Benson, C. (2002), Use of Class C Fly Ash for Stabilization of Soft Subgrade, *Proc. 5th Intl. Congress on Advances in Civil Engineering*, Istanbul Technical University, Istanbul, Turkey, 963-972. ☞
- Simon, D., Alumbaugh, D., and Benson, C. (2001), Quantitative Characterization of an IAS Air Plume Using Geophysics, *Proc. 2001 Intl. Containment and Remediation Conference*, Institute for International Cooperative Environmental Research, Florida State University, Tallahassee, FL, USA, 1-4. ☞
- Waugh, W., Glenn, E., Benson, C., Albright, W., Brusseau, M., Bush, R., and Dayvault, J. (2016), Applications of Ecological Engineering Remedies for Uranium Processing Sites, USA, *Proc. Intl. Conference on Advancing the Global Implementation of Decommissioning and Environmental Remediation Programs*, 23-27 May 2016, Madrid, Spain. ☞
- Waugh, W., Albright, W., and Benson, C. (2007), Alternative Covers: Enhanced Soil Water Storage and Evapotranspiration in the Source Zone, Enhancements to Natural Attenuation: Selected Case Studies, T. Early, Ed., Savannah River National Laboratory, Aiken, SC, 9-15. ☞
- Yesiller, N., Benson, C., Edil, T., and Klima, J. (1997), Assessment of Cased-Borehole Seals Using and Ultrasonic Method, *Proc. Fifth Great Lakes Geotechnical/Geoenvironmental Conference*, Ann Arbor, Michigan, 133-152. ☞

Reviews, Editorials, and Magazine Articles

- Albright, W., Benson, C., G. Gee, Abichou, T., Roesler, A., and Rock, S. (2003), Examining the Alternatives, *Civil Engineering*, 73(1), 70-75. ↵
- Barlaz, M., Benson, C., Castaldi, M., and Luettich, S. (2016), Diagnosing and Understanding Elevated Temperature Landfills, Part 1 - Characteristics and Management Challenges, *Waste360*, Penton Media, New York. ↵
- Barlaz, M., Benson, C., Castaldi, M., and Luettich, S. (2017), Diagnosing and Understanding Elevated Temperature Landfills, Part 2 – Biological Reactions, *Waste360*, Penton Media, New York. ↵
- Barlaz, M., Benson, C., Castaldi, M., and Luettich, S. (2017), Diagnosing and Understanding Elevated Temperature Landfills, Part 3 – Chemical Reactions, *Waste360*, Penton Media, New York. ↵
- Benson, C. (2016), The Future of Environmental Geotechnics: Creating the New Value Proposition, *Environmental Geotechnics*, 3(2), 61-62. ↵
- Benson, C. (2014), Sustainable Water Balance Final Cover for Missoula Landfill, *Montana Solid Waste News*, Summer 2014, Montana Department of Environmental Quality, Helena, MT, 5.
- Benson, C. (2012), The Year Ahead, *Geo-Strata*, November/December, 8.
- Benson, C. (2006), Numerical Modeling in Geoenvironmental Practice, *Geo-Strata*, Aug. 2006. ↵
- Benson, C. (1996), An Overview of Uncertainty '96, *Geotechnical News*, June, 1996.
- Benson, C. and Breitmeyer, R. (2010), Using Inversion to Improve Prediction in Geoenvironmental Engineering, *Geo-Strata*, 14(1), 22-27. ↵
- Benson, C. and Pliska, R. (1996), HELP Needs Help from the Field, *Waste Age*, March 1996. ↵
- Benson, C. and Edil, T. (1995), Using Shredded Scrap Tires in Civil & Environmental Construction, *Resource Recycling*, Oct. 1995. ↵
- Benson, C. (1992), Remotely Monitoring Field-Scale Performance of Final Covers, *Technology Report*, Waste Management, Inc., First Quarter 1992. ↵
- Benson, C. (1990), Waste Geotechnics at the University of Wisconsin-Madison, *Geotechnical News*, December, 1990, 43-46.
- Benson, C. (1990), Review of *Clay Liners for Waste Management Facilities*, *J. of Environmental Quality*, November 1990.
- Bradshaw, S., Benson, C., Edil, T., and Gallagher, B. (2023), Life Cycle Impacts of Harvested Ash in Concrete, *Ash at Work, Applications, Science, and Sustainability of Coal Ash*, Issue 2, 16-19. ↵
- Edil, T. and Benson, C. (2002), Use of Industrial By-Products as Geo-Materials, *Geo-Strata*, April 2002. ↵
- Edil, T. and Benson, C. (2006), Geotechnical Applications of CCPs in Wisconsin, *Ash At Work*, American Coal Ash Association, Summer 2004, 16-20. ↵
- Fox, P. and Benson, C. (2014), Forum Articles and the JGGE, *J. Geotech. Geoenvironmental Eng.*, 01614002-1. ↵
- McCartney, J. and Benson, C. (2011), Laboratory Testing for Unsaturated Soils: A Primer, *Geo-Strata*, 15(2), 19-23. ↵

Reports

- Abichou, T., Benson, C., and Edil, T. (1999), Beneficial Reuse of Foundry Byproducts, Environmental Geotechnics Report 99-1, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Abichou, T., Benson, C., and Edil, T. (1998), Beneficial Reuse of Foundry Sands in Construction of Hydraulic Barrier Layers, Environmental Geotechnics Report 98-2 Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵

- Abichou, T., Benson, C., and Edil, T. (1998), Field Hydraulic Conductivity of Three Test Pads Constructed with Foundry Sands, Environmental Geotechnics Report 98-14, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Acosta, H., Edil, T., and Benson, C. (2003), Soil Stabilization and Drying Using Fly Ash, Geo Engineering Report 03-03, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Albright, W. and Benson, C. (2002), Alternative Cover Assessment Program 2002 Annual Report, Publication No. 41182, Desert Research Institute, Reno, Nevada. ↗
- Bareither, C., Karimi, S., Scalia, J., and Benson, C. (2023), Evaluation and Management of Wet Waste Disposal in Municipal Solid Waste Landfills, Environmental Research and Education Foundation, Raleigh, NC. ↗
- Bareither, C., Barlaz, M., Doran, M., and Benson, C. (2014), Retrospective Analysis of Wisconsin's Landfill Organic Stability Rule: Is the Rule Meeting Its Objectives?, Sustainability Report No. 14-07, Office of Sustainability, University of Wisconsin-Madison, Madison, Wisconsin. ↗
- Bareither, C., Benson, C., Barlaz, M., and Morris, J. (2008), Performance of North American Bioreactor Landfills, Office of Research and Development, US Environmental Protection Agency, Cincinnati, Ohio. ↗
- Bareither, C., Edil, T., and Benson, C. (2007), Determination of Shear Strength Values for Granular Backfill Materials Used by WisDOT, SPR No. 0092-05-08, Wisconsin Highway Research Program, Madison, WI. ↗
- Bazzell, D., Benson, C., Cancian, M., Drinkwater, N., Goldman, I., Gunther, A., Lewis, J., May, K., Meinholz, L., Radomski, N., Seshadri, A., Underwood, J., Warfield, T., Gustafson, A., Norris, T., and Hildebrand, S. (2014), University of Wisconsin-Madison Budget Allocation Model Past, Present and Possibilities, Report to the Chancellor, Budget Model Review Committee, University of Wisconsin-Madison. ↗
- Benson, C. (2021), Water Flow in Coal Combustion Products and Drainage of Free Water, Technical Brief 3002021963, Electric Power Research Institute, Palo Alto, CA. ↗
- Benson, C. (2019), White Paper: Strategies for Containment at Coal Combustion Product Facilities, Report to Electric Power Research Institute, Palo Alto, CA. ↗
- Benson, C. and Benavides, J. (2018), Geochemical Assessment of Long-Term Leachate Quality and Impacts of Wastewater Management Practices at Coal Combustion Product (CCP) Storage Facilities – Progress Summary, Report No. GENV-18-09, School of Engineering, University of Virginia. ↗
- Benson, C. and Gustitus, S. (2018), Predicting Long-Term Percolation from the SDF Closure Cap, Report No. GENV-18-05, School of Engineering, University of Virginia. ↗
- Benson, C. and Tan, Y. (2023), Data Summary Report: Hydraulic Conductivity of Bentonite-Polymer Composite (BPC) Geosynthetic Clay Liners Permeated with an Acidic Copper Heap Leach Solution, Report No. WGL-23-16, Wisconsin Geotechnics Laboratory, University of Wisconsin-Madison. ↗
- Benson, C., Tan, Y., Benavides, J. (2022), Hydrologic Analysis of Disposal Basins for Coal Combustion Products, Report No. 3002023682, Electric Power Research Institute (EPRI), Palo Alto, CA. ↗
- Benson, C. and Tian, K. (2018), Stress-Induced Porewater Pressures in the Vadose Zone Beneath the Environmental Management Waste Management Facility, Report No. GENV-18-09, School of Engineering, University of Virginia. ↗
- Benson, C., Brown, B., Edil, T., and Bradshaw, S., (2015), Leaching from Roadway Substructures Constructed with Coal Combustion Products, Report No. 3002006091, Electric Power Research Institute (EPRI), Palo Alto, CA. ↗

- Benson, C., Chen, J., and Edil, T. (2014), Engineering Properties of Geosynthetic Clay Liners Permeated with Coal Combustion Product Leachates, Report No. 3002003770, Electric Power Research Institute (EPRI), Palo Alto, CA. ↩
- Benson, C., Chen, J., Edil, T., and Likos, W. (2016), Hydraulic Conductivity of Compacted Soil Liners Permeated with Coal Combustion Product Leachates, Report No. 3002008482, Electric Power Research Institute (EPRI), Palo Alto, CA. ↩
- Benson, C., Albright, W., Fratta, D., Tinjum, J., Kucukkirca, E., Lee, S., Scalia, J., Schlicht, P., and Wang, X. (2011), Engineered Covers for Waste Containment: Changes in Engineering Properties & Implications for Long-Term Performance Assessment, NUREG/CR-7028, Office of Research, U.S. Nuclear Regulatory Commission, Washington. ↩ Appendix ↩
- Benson, C., Edil, T., Lee, J., and Bradshaw, S. (2010), Quantifying the Benefits of Using Coal Combustion Products in Sustainable Construction, Report No. 1020552, Electric Power Research Institute (EPRI), Palo Alto, CA. ↩
- Benson, C. and Oren, A. (2009), Factors Contributing to Excessive Leakage from a Waste Water Lagoon in Heber Valley, Utah, Geo Engineering Report No. 09-32, University of Wisconsin, Madison, Wisconsin. ↩
- Benson, C., Lee, S., and Oren, A. (2008), Evaluation of Three Organoclays for an Adsorptive Barrier to Manage DNAPL and Dissolved-Phase Polycyclic Aromatic Hydrocarbons (PAHs) in Ground Water, Geo Engineering Report No. 08-24, University of Wisconsin, Madison, Wisconsin. ↩
- Benson, C. (2008), On-Site Disposal Facilities for Department of Energy Sites: Current Status and Future Implications, Independent Technical Review Committee, US Department of Energy, Washington, DC. ↩
- Benson, C., Abichou, T., Wang, X., Gee, G., and Albright, W. (1999), Test Section Installation Instructions – Alternative Cover Assessment Program, Environmental Geotechnics Report 99-3, Dept. of Civil & Environmental Engineering, University of Wisconsin-Madison. ↩
- Benson, C., Albright, W., Ray, D., and Smegal, J. (2008), Review of the Environmental Management Waste Management Facility at Oak Ridge, Independent Technical Review Committee, US Department of Energy, Washington, DC. ↩
- Benson, C., Albright, W., Ray, D., and Smegal, J. (2008), Review of Issues Associated with the Proposed On-Site Waste Disposal Facility (OSWDF) at Portsmouth, Independent Technical Review Committee, US Department of Energy, Washington, DC. ↩
- Benson, C., Albright, W., Ray, D., and Smegal, J. (2008), Review of Proposed On-Site Disposal Facility at the Paducah Gaseous Diffusion Plant, Independent Technical Review Committee, US Department of Energy, Washington, DC. ↩
- Benson, C., Albright, W., Ray, D., and Smegal, J. (2008), Review of Disposal Practices at the Nevada Test Site, Independent Technical Review Committee, US Department of Energy, Washington, DC. ↩
- Benson, C., Albright, W., Ray, D., and Smegal, J. (2008), Review of Disposal Practices at the Savannah River Site, Independent Technical Review Committee, US Department of Energy, Washington, DC. ↩
- Benson, C., Albright, W., and Ray, D. (2007), Evaluating Operational Issues at the Environmental Restoration Disposal Facility at Hanford, Independent Technical Review Committee, US Department of Energy, Washington, DC.
- Benson, C., Albright, W., Ray, D., and Smegal, J. (2007), Review of the Idaho CERCLA Disposal Facility (ICDF) at Idaho National Laboratory, Independent Technical Review Committee, US Department of Energy, Washington, DC. ↩

- Benson, C., Albright, W., Wang, X., and MacDonald, E. (2006), Assessment of the ACAP Test Sections at Kiefer Landfill: Hydraulic Properties and Geomorphology, Geo Engineering Report No. 02-16, University of Wisconsin, Madison, Wisconsin. ↗
- Benson, C., Barlaz, M., Lane, D., and Rawe, J. (2003), State-of-the-Practice Review of Bioreactor Landfills, Geo Engineering Report 03-05, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C., Kucukkirca, I., and Scalia, J. (2008), Properties of Geosynthetics Exhumed from the Seven Mile Creek Landfill Eau Claire, Wisconsin, Geo Engineering Report No. 08-22, University of Wisconsin, Madison, Wisconsin. ↗
- Benson, C., Lee, S., Wang, X., Albright, W., and Waugh, W. (2008), Hydraulic Properties and Geomorphology of the Earthen Component of the Final Cover at the Monticello Uranium Mill Tailings Repository, Geological Engineering Report No. 08-04, University of Wisconsin, Madison, Wisconsin. ↗
- Benson, C. and Wang, X. (1998), Soil Water Characteristic Curves for Solid Waste, Environmental Geotechnics Report 98-13, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C., Waugh, W., Albright, W., and Smith, G. (2013), Cover Performance Enhancement Tests at the Grand Junction, Colorado Disposal Site: Construction Documentation, Material Testing, and Instrument Calibration, Report LMS/GRJ/S07112, Office of Legacy Management, US Department of Energy. ↗
- Benson, C., Albrecht, B., Motan, E., and Querio, A. (1998), Equivalency Assessment for an Alternative Final Cover Proposed for the Greater Wenatchee Regional Landfill and Recycling Center, Environmental Geotechnics Report 98-6, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. (1998), Comparison of the Effectiveness of Prescriptive and Alternative Covers: Mead Paper, Escanaba, Michigan, Environmental Geotechnics Report 98-13 Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. (1997), A Review of Alternative Landfill Cover Demonstrations, Environmental Geotechnics Report 97-1, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. and Hill, T. (1997), Results of Field Hydraulic Conductivity Tests Conducted on Mine Backfill: Flambeau Mine, Environmental Geotechnics Report 97-4, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. and Wang, X. (1997), Assessment of Green Sands from Wagner Castings Co. as Barrier Materials for Landfill Covers, Environmental Geotechnics Report 97-8, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C., Bosscher, P., and Jong, D. (1997), Predicting Seasonal Changes in Pavement Stiffness and Capacity Caused by Freezing and Thawing, Geotechnical Engineering Report 97-9, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. and Wang, X. (1996), Field Hydraulic Conductivity Assessment of the NCASI Final Cover Test Plots, Environmental Geotechnics Report 96-9, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. (1996), Final Cover Hydrologic Evaluation - Project Summary, Environmental Geotechnics Report 96-4, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. (1994), Assessment of Air Permeability and Freeze-Thaw Resistance of Soils Proposed for Use in the Final Cover at Greater Wenatchee Regional Landfill, Environmental Geotechnics

- Report 94-3, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. and Rashad, S. (1994), Using Co-Kriging to Enhance Hydrogeologic Characterization, Final Report-Year 2, Environmental Geotechnics Report 94-1, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Benson, C., Khire, M., and Bosscher, P. (1993), Final Cover Hydrologic Evaluation: Phase II - Final Report, Environmental Geotechnics Report 93-4, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Benson, C. and Bosscher, P. (1992), Effect of Winter Exposure on the Hydraulic Conductivity of a Test Pad, Environmental Geotechnics Report 92-8, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. (1992), Comparison of In Situ and Laboratory Measurements of Hydraulic Conductivity on a Test Pad with Construction Defects, Environmental Geotechnics Report 92-7, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C., Zhai, H., and Rashad, S. (1992), Assessment of Construction Quality Control Measurements and Sampling Frequencies for Compacted Soil Liners, Environmental Geotechnics Report 92-6, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Benson, C. and Khire, M. (1992), Soil Reinforcement with Strips of Reclaimed HDPE, Environmental Geotechnics Report 92-5, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. and Hardianto, F. (1992), Hydraulic Conductivity Assessment of Compacted Soil Liners: Phase I-Final Report, Environmental Geotechnics Report 92-4, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Benson, C. and Cooper, S. (1992), Reducing Uncertainty in Hydraulic Conductivity Using Soil Classifications from the Cone Penetrometer - Progress Report for First Quarter of Work, Environmental Geotechnics Report 92-2, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. and Lane, D. (1992), Final Cover Hydrologic Evaluation - Review of First Quarter of Work, Environmental Geotechnics Report No. 92-1, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. (1991), Quality Assurance and Hydraulic Conductivity Assessment - Review of First Six Months Work, Environmental Geotechnics Report No. 91-6, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. (1991), Hydrologic Analysis of a Co-Composter Landfill Cell, Environmental Geotechnics Report No. 91-4, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. and Othman, M. (1991), Effect of Freeze-Thaw on the Hydraulic Conductivity of Compacted Clay, Environmental Geotechnics Report No. 91-3, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Benson, C. (1991), Minimum Thickness of Compacted Soil Liners, Environmental Geotechnics Report No. 91-2, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Benson, C. (1989), A Stochastic Analysis of Water and Chemical Flow in Compacted Soil Liners, Ph.D. Dissertation, University of Texas at Austin, Austin, Texas, 246 p.
- Benson, C. (1987), A Comparison of In Situ and Laboratory Measurements of Hydraulic Conductivity, Geotechnical Engineering Report 87-2 and M.S. Thesis, University of Texas at Austin, 80 p.

- Bin-Shafique, S., Edil, T., Benson, C., and Senol, A. (2003), Incorporating a Fly Ash Stabilized Layer into Pavement Design – Case Study, Geo Engineering Report 03-04, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Bin-Shafique, S., Benson, C., and Edil, T. (2002), Leaching of Heavy Metals from Fly Ash Stabilized Soils Used in Highway Pavements, Geo Engineering Report 02-14, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Bolen, M., Roesler, A., Benson, C., and Albright, W. (2001), Alternative Cover Assessment Program: Phase II Report, Geo-Engineering Report No. 01-10, University of Wisconsin, Madison, WI. ↵
- Bosscher, P., Jong, D., and Benson, C. (1998), User's Guide for UW Frost, Geotechnical Engineering Report 98-11 Dept. of Civil and Environmental Engineering, Univ. of Wisconsin-Madison. ↵
- Bradshaw, S. and Benson, C. (2011), Effect of Cation Exchange During Subgrade Hydration and Municipal Solid Waste Leachate Permeation on the Hydraulic Conductivity of Geosynthetic Clay Liners, Geotechnics Report 11-9, University of Wisconsin, Madison, WI. ↵
- Bradshaw, S., Benson, C., and Edil, T. (2023), Harvested Coal Ash Used as a Cement Replacement in Concrete: Life Cycle Impacts, Report No. 3002024165, Electric Power Research Institute, Palo Alto, CA. ↵
- Camargo, F., Edil, T., Benson, C., and Martono, W. (2008), In Situ Stabilization of Gravel Roads with Fly Ash, Geo-Engineering Report No. 08-25, University of Wisconsin, Madison, WI. ↵
- Chamberlain, E., Erickson, A., and Benson, C. (1997), Frost Resistance of Cover and Liner Materials for Landfills and Hazardous Waste Sites, Report 97-29, US Army Cold Regions Research and Engineering Laboratory, Hanover, NH. ↵
- Chen, J. and Benson, C. (2023), Leachate Generation Rates for Coal Combustion Product Landfills - Effects of Climate, Size, Placement, and Final Cover, Report No. 3002027198, Electric Power Research Institute, Palo Alto, CA. ↵
- Christman, M., Edil, T., Benson, C., and Riewe, T. (1999), Field Evaluation of Annular Well Seals, Environmental Geotechnics Report 99-2, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Cooper, S. and Benson, C. (1993), An Evaluation of How Subsurface Characterization Using Soil Classifications Affects Predictions of Contaminant Transport, Environmental Geotechnics Report 93-1, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Dingrando, J., Benson, C., and Edil, T. (1999), Beneficial Reuse of Foundry Sand in Controlled Low-Strength Material, Environmental Geotechnics Report 99-5 Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Edincliler, A., Benson, C., and Edil, T. (1996), Shear Strength of Municipal Solid Waste, Environmental Geotechnics Report 96-2, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Edil, T. and Benson, C. (2002), Compatibility of Containment Systems with Mine Waste Liquids, Report No. WRI GRR 01-09, Water Resources Institute, University of Wisconsin-Madison. ↵
- Elder, C., Benson, C., and Eykholt, G. (1998), Air Plume Conceptualization and Mass Transfer Modeling for In Situ Air Sparging, Environmental Geotechnics Report 98-3, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Foose, G., Benson, C., Edil, T. (1996), Methods for Evaluating the Effectiveness of Landfill Liners, Environmental Geotechnics Report 96-10, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Foose, G., Benson, C., and Edil, T. (1995), Evaluating the Effectiveness of Landfill Liners, Environmental Geotechnics Report 95-4, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵

- Foose, G., Benson, C., and Bosscher, P. (1993), Shear Strength of Sand Reinforced with Shredded Waste Tires, Environmental Geotechnics Report 93-2, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Fuhrmann, M., Benson, C. Waugh, J., Williams, M., and Arlt, H. (2019), Proceedings of the Radon Barriers Workshop, NUREG/CP-0312, Office of Nuclear Regulatory Research, US Nuclear Regulatory Commission, Washington. ☞
- Gibson, S., Edil, T., and Benson, C. (1999), Assessing Exploratory Borehole Seals with Electrical Geophysical Techniques, Environmental Geotechnics Report 99-4 Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Goodhue, M., Edil, T., and Benson, C. (1998), Reuse of Foundry Sands in Reinforced Earth Structures, Environmental Geotechnics Report 98-16, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Grasso, D., Benson, C., Carrico, A., Chandran, K., Clough, G., Crittenden, J., Greenbaum, D., Hamburg, S., Harmon, T., Hughes, J., Jones, K., Marr, L., Perciasepe, R., Polasky, S., Savitz, M., Scott, N., Trussell, R., and Zimmerman, J. (2018), Environmental Engineering for the 21st Century Addressing the Grand Challenges, Consensus Study Report, National Academies Press, Washington, DC. ☞
- Gurdal, T., Benson, C., and Albright, W. (2003), Hydrologic Properties of Final Cover Soils from the Alternative Cover Assessment Program, Geo Engineering Report 03-02, Geo Engineering Program, University of Wisconsin-Madison. ☞
- Hensel, B., Benson, C., Bittner, A., and Kondziolka, J. (2019), Relative Liner Performance for Coal Combustion Product Management Sites - Conceptual Review and Model Evaluation for Surface Impoundments, Report No. 3002016498, Electric Power Research Institute, Palo Alto, CA. ☞
- IAEA (2023), Technical Aspects Related to the Design and Construction of Engineered Containment Barriers for Environmental Remediation, Technical Reports Series No. 493, International Atomic Energy Agency, Vienna. ☞
- Khire, M., Benson, C. and Bosscher, P. (1994), Final Cover Hydrologic Evaluation, Phase III Report, Environmental Geotechnics Report 94-4, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Kim, K. and Benson, C. (2002), Water Content Calibrations for Final Cover Soils, Geo Engineering Report 02-12, Geo Engineering Program, University of Wisconsin-Madison. ☞
- Kleven, J., Edil, T., and Benson, C. (1998), Mechanical Properties of Excess Foundry Sand for Roadway Subgrade, Environmental Geotechnics Report 98-1 Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Klima, J., Edil, T., and Benson, C. (1996), Field Assessment of Monitoring and Water Supply Well Seals, Environmental Geotechnics Report 96-11, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Kosson, D., Salisbury, J., Powers, C., Benson, C., Bliss, L., Brown, K., Burger, J., Burkhardt, B., Clarke, J., Fyffe, L., Gochfeld, M., Higley, K., Hornberger, G., Jones, K., Krahn, S., LeBoeuf, E., Mayer, H., Stewart, R., and Turner, H. (2018), Hanford Site-Wide Risk Review Project - Final Report, Submitted to Department of Environmental Management, US Department of Energy, by Consortium for Risk Evaluation with Stakeholder Participation, Vanderbilt University, Nashville, TN. ☞
- Kosson, D., Garrabrants, A., Wang, X., Qui, Q., Chen, Z., DeLapp, R., van der Sloot, H., Benson, C., Chen, J., and Benavides, J. (2020), Leaching, Geotechnical, and Hydrologic Characterization of Coal Combustion Products from a Closed Coal Ash Impoundment, Report No. 3002017363, Electric Power Research Institute (EPRI), Palo Alto, CA. ☞

- Kraus, J. and Benson, C. (1994), Effect of Freeze-Thaw on the Hydraulic Conductivity of Three Paper Mill Sludges: Laboratory and Field Evaluation, Environmental Geotechnics Report 94-6, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Kraus, J. and Benson, C. (1994), Laboratory and Field Evaluation of the Effect of Freeze-Thaw on the Hydraulic Conductivity of Barrier Materials, Environmental Geotechnics Report 94-5, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ↻
- Lane, D., Benson, C., and Bosscher, P. (1992), Hydrologic Observations and Modeling Assessments of Landfill Covers: Phase I-Final Report, Environmental Geotechnics Report 92-10, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ↻
- Lau, A., Edil, T., and Benson, C. (2001), Use of Geocells in Flexible Pavements Over Poor Subgrades, Geo Engineering Report 01-05, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↻
- Lee, T. and Benson, C. (2002), Using Waste Foundry Sands as Reactive Media in Permeable Reactive Barriers, Geo Engineering Report 02-01, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↻
- Li, L., Benson, C. and Edil, T. (2005), Assessing Groundwater Impacts from Coal Combustion Products Used in Highways, Geo Engineering Report No. 05-22, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Li, L., Eykholt, G., and Benson, C. (2001), Groundwater Modeling: Semi-Analytical Approaches for Heterogeneity and Reaction Networks, Groundwater Research Report WRI GRR 01-10, Water Resources Institute, University of Wisconsin-Madison. ↻
- Maxwell, S., Kim, W., Edil, T., and Benson, C. (2005), Effectiveness of Geosynthetics in Stabilizing Soft Subgrades, Report 0092-45-15, Wisconsin Highway Research Program, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↻
- Meer, S. and Benson, C. (2004), In-Service Hydraulic Conductivity of GCLs in Landfill Covers, Geo Engineering Report 04-17, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↻
- Meerdink, J. and Benson, C. (1994), Unsaturated Hydraulic Conductivity of Two Compacted Barrier Soils, Environmental Geotechnics Report 94-6, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Mengelt, M., Edil, T., and Benson, C. (2000), Reinforcement of Flexible Pavements Using Geocells, Geo Engineering Report 00-4, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↻
- Nelson, M. and Benson, C. (2002), Laboratory Hydraulic Conductivity Testing Protocols for Paper Industry Residuals Used for Hydraulic Barrier Layers, Technical Bulletin No. 848, National Council for Air and Stream Improvement, Research Triangle Park, NC. ↻
- Nelson, M. and Benson, C. (2002), Laboratory Hydraulic Conductivity Testing Protocols for Paper Sludges Used for Hydraulic Barriers, Geo Engineering Report 02-02, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↻
- Palmer, B., Benson, C., and Edil, T. (1997), Class F Fly Ash as a Barrier Material: Laboratory and Field Evaluation, Environmental Geotechnics Report 97-6, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↻
- Roesler, A., Benson, C., and Albright, W. (2002), Field Hydrology and Model Predictions for Final Covers in the Alternative Cover Assessment Program – 2002, Geo Engineering Report 02-08, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↻
- Russell, J., Benson, C. and Jeljeli, M. (1990), Use of Monte Carlo Techniques to Enhance Qualifier-1 Contractor Prequalification Model, Technical Report No. 102, Construction Engineering and

- Management Program, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Samuelson, M. and Benson, C. (1997), Predicting Frost Depths Beneath Flexible Roadways Using a Thermal Model, Environmental Geotechnics Report 97-5, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Sauer, J., Benson, C. and Edil, T. (2005), Metals Leaching from Highway Test Sections Constructed with Industrial Byproducts, Geo Engineering Report No. 05-21, Departmental of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Sauer, J., Benson, C. and Edil, T. (2005), Leaching of Heavy Metals from Organic Soils Stabilized with High Carbon Fly Ash, Geo Engineering Report No. 05-01, Departmental of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Smith, C. and Benson, C. (2016), Influence of Coupling Erosion and Hydrology on the Long-Term Performance of Engineered Surface Barriers, NUREG/CR-7200, Office of Research, US Nuclear Regulatory Commission, Washington, DC. ☞
- Tatliso, N., Edil, T., Benson, C., Park, J., and Kim, J. (1996), Review of Environmental Suitability of Scrap Tires, Environmental Geotechnics Report 96-7, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Trast, J. and Benson, C. (1993), Hydraulic Conductivity of Thirteen Compacted Clays, Environmental Geotechnics Report 93-3, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Williams, M., Fuhrmann, M., Stefani, N., Michaud, A., Likos, W., Benson, C., and Waugh, W. (2022), Evaluation of In-Service Radon Barriers over Uranium Mill Tailings Disposal Facilities, NUREG/CR-7288, Office of Research, US Nuclear Reg. Comm., Washington, DC. ☞ Appx. ☞
- Yesiller, N., Edil, T., and Benson, C. (1994), Ultrasonic Evaluation of Cased Borehole Seals, Environmental Geotechnics Report 94-8, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Yesiller, N., Edil, T., and Benson, C. (1994), Verification Technique to Evaluate the Integrity of Well Seals, Environmental Geotechnics Report 94-2, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.

Standards

- Benson, C. (2011), Standard D 6391, Standard Test Method for Field Measurement of Hydraulic Conductivity Using Borehole Infiltration, *Annual Book of Standards*, ASTM Intl., 04.09.
- Benson, C. (2007), Standard D 7243, Standard Guide for Measuring the Saturated Hydraulic Conductivity of Paper Industry Sludges, *Annual Book of Standards*, ASTM Intl., 04.09.
- Benson, C., Wang, X. and Kim, H. (2007), Standard D 6836, Test Methods for Determination of the Soil Water Characteristic Curve for Desorption Using a Hanging Column, Pressure Extractor, Chilled Mirror Hygrometer, and/or Centrifuge, *Annual Book of Standards*, ASTM Intl., 04.09.
- Bradshaw, S., Scalia, J., Benson, C., and Rauen, T. (2010), Standard D 7503, Standard Test Method for Measuring the Exchange Complex and Cation Exchange Capacity of Inorganic Fine-Grained Soils, *Annual Book of Standards*, ASTM Intl., 04.09.
- Daniel, D. and Benson, C. (2002), Standard D 5856, Test Method for Measurement of Hydraulic Conductivity of Porous Material Using a Rigid-Wall Compaction Mold Permeameter, *Annual Book of Standards*, ASTM Intl., 04.09. Originally approved 1995, Revised 2002.
- Ladd, R. and Benson, C. (2000), Standard D 5084, Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter, *Annual Book of Standards*, ASTM Intl., 04.09. Extensive revision in 2000 by R. Ladd and C. Benson. Originally developed by J. Dunn and D. Daniel.

Yesiller, N., Shackelford, C., and Benson, C. (2005), Standard D 7100, Standard Test Method for Hydraulic Conductivity Compatibility Testing of Soils with Aqueous Solutions that may Alter Hydraulic Conductivity, *Annual Book of Standards*, ASTM Intl., 04.09.

SPONSORED RESEARCH

Environmental Containment Systems

Field and Laboratory Assessment of the Radon Barrier at the Mexican Hat, Utah Disposal Site, US Department of Energy, Office of Legacy Management, with W. Likos.

Understanding, Managing, and Preventing Clogging of Landfill Systems with Black Sticky Material, Environmental Research and Education Foundation.

Effectiveness of Landfill Liners to Control Transport of PFAS in Leachate, Environmental Research and Education Foundation.

Spatial and Temporal Correlation Between Physical and Chemical Odor Measurements and Odor Complaints, Advanced Disposal Services, with A. Benson.

Evaluation and Management of High-Moisture Waste Disposal in Municipal Solid Waste Landfills, Environmental Research and Education Foundation, with J. Scalia and C. Bareither (Colorado State University).

Geochemical Assessment of Long Term Leachate Quality and Impacts of Wastewater Management Practices at Coal Combustion Product (CCP) Disposal Facilities, Electric Power Research Institute, with D. Kosson (Vanderbilt University).

Water Balance Analysis and Data Quality Assurance Assessment for Monticello and Grand Junction Disposal Cell Lysimetry, Navarro Corporation and US Department of Energy.

Service Life of Bentonite-Polymer Geosynthetic Clay Liners, CETCO, Inc.

Behavior of Bentonite-Polymer Geosynthetic Clay Liners Permeated with Aggressive Leachates, CETCO, Inc., with W. Likos.

Evaluating the Long-Term Performance of the SDF Closure Cap, Savannah River Remediation, Inc. and US Department of Energy.

Understanding and Predicting Temperatures in Municipal Solid Waste Landfills, Environmental Research and Education Foundation, with M. Barlaz, NC State University.

Evaluating Effectiveness of Surface Covers for Controlling Water and Radon Fluxes at Uranium Mill Tailings Disposal Facilities, US Nuclear Regulatory Commission, with W. Likos.

Behavior of Polymer-Modified Bentonites Contacted with Aggressive Leachates, Colloid Environmental Technologies Corporation, with W. Likos.

Compatibility of Compacted Clay Liners and Leachate from CCP Containment Facilities, Electric Power Research Institute.

Compatibility of Geosynthetic Clay Liners and Leachate from CCP Containment Facilities, Electric Power Research Institute.

Bench-Scale Comparison of EVOH and HDPE Geomembranes as Barriers to VOC and Methane Emissions, Kuraray America Inc.

Consortium for Risk Evaluation and Stakeholder Participation, US Department of Energy, with Vanderbilt University, Rutgers University, New York University, Oregon State University, University of Pittsburgh, Howard University, University of Arizona, Robert Wood Johnson Medical School.

Coupling Effects of Erosion and Hydrology on the Long-Term Performance of Engineered Surface Barriers, US Nuclear Regulatory Commission

Predicting the Long-Term Performance of Surface Barriers for LLRW Containment, US Department of Energy, Consortium for Risk Evaluation with Stakeholder Participation

Effectiveness of Engineered Covers: From Modeling to Performance Monitoring, US Nuclear Regulatory Commission

Bentonite-Polymer Nanocomposites for Geoenvironmental Applications, National Science Foundation, with T. Edil and C. Shackelford

Prion Transport in Porous Media: Influence of Electrostatic and Non-DLVO Interactions, National Science Foundation, with J. Pedersen and J. Aiken

Effect of Stress, Hydration, and Ion Exchange on the Hydraulic Conductivity of Geosynthetic Clay Liners, Colloid Environmental Technologies Corporation

Innovative Methods for Natural Restoration of Final Covers for Mill Tailings, US Dept. of Energy, with W. Albright and J. Waugh

Evaluating Long-Term Impacts on Final Covers - Exhumation of the ACAP Test Sections, National Science Foundation, US Environmental Protection Agency, Environmental Research and Education Foundation, with D. Fratta and W. Albright

Toxin/Pathogen Inactivation and Disposal of Intentionally Contaminated Foods, National Center for Food Protection and Defense, US Dept. of Homeland Security, with D. Noguera

Predictive Tools for Sustainable Solid Waste Management Using Bioreactor Landfills, National Science Foundation, with M. Barlaz (*Bioreactor Partnership*)

The State of Municipal Solid Waste Bioreactor Landfills-II, US Environmental Protection Agency, with M. Barlaz

VOC Transport Through Composite Landfill Liners, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

VOC Transport in Lined Containment Facilities, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

Hydrology of the Monticello Water Balance Cover, Stoller Corporation and US Dept. of Energy.

Effect of Freeze Thaw on Compacted Soil Liners and Covers, University of Wisconsin Graduate School.

Fate and Transport of Chronic Waste Disease Prions in Municipal Solid Waste Landfills, US Environmental Protection Agency, with J. Pedersen and J. Aiken.

Evaluation of VOC Contamination of Groundwater from Lined Landfills in Wisconsin, Groundwater Research Advisory Council, State of Wisconsin.

Hydrologic Modeling of Covers Used for Mine Waste Containment, US Environmental Protection Agency, with C. Shackelford.

Bioreactor Landfills: State of the Practice, US Environmental Protection Agency, with D. Lane and M. Barlaz.

Field Performance of Alternative Covers, US Environmental Protection Agency.

Integrated Long-Term Stewardship for Low-Level Radioactive Waste, US Department of Energy and Flour Fernald, Fernald, Ohio.

Chemical Interactions Between Mine Waste Liquids and Geosynthetics, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

Long-term Chemical Compatibility of Geosynthetic Clay Liners, National Science Foundation, with C. Shackelford.

Hydraulic Conductivity Testing Protocols for Paper Sludges, National Council of the Pulp and Paper Industry for Air and Stream Improvement.

Dry Barriers for Waste Containment, National Science Foundation, with S. Kung

Alternative Cover Assessment Program, United States Environmental Protection Agency, with W. Albright (Desert Research Institute) and Glendon Gee (Battelle PNNL).

Large-Scale Verification of a VOC Transport Model for Composite Liners, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

Field Assessment of Geosynthetic Clay Liners in Final Covers, United States Environmental Protection Agency.

Unsaturated Hydraulic Properties of Alternative Cover Soils, Waste Management, Waste Connections, Bluestem Solid Waste Authority, and Marina Solid Waste Management District

Alternative Covers for Waste Containment in Southern California, San Bernardino County, CA.

Equivalency of Subtitle D and Alternative Earthen Covers, City of Glendale, Arizona.

Development of *Win*UNSAT-H, a Windows Implementation of UNSAT-H, WMX Technologies.

Hydraulic Characterization of Mine Rock Backfill for the Flambeau Mine, Flambeau Mining Company, Ladysmith, WI

Hydraulic Characterization of Mine Rock Backfill for the Flambeau Mine: II-In Situ Verification, Flambeau Mining Company, Ladysmith, WI

Field Hydraulic Conductivity Assessment of the NCASI Test Plots, National Council of the Paper Industry for Air and Stream Improvement

Effect of Freeze-Thaw on the Hydraulic Conductivity of Compacted Papermill Sludge, the National Council of the Paper Industry for Air and Stream Improvement.

Engineering Properties of Paper Sludges Used for Hydraulic Barriers in Landfill Covers, Solid Waste Research Program, State of Wisconsin.

Shear Strength of Municipal Solid Waste, WMX Technologies, Inc., with T. Edil.

Evaluating the Effectiveness of Landfill Liners, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

Laboratory and Field Evaluation of the Effects of Freeze-Thaw on Barrier Materials, United States Environmental Protection Agency.

Field-Evaluation of Geoinsulation-A Geosynthetic Insulation Material, Envotech Limited Partnership, with P. Bosscher

Hydraulic Conductivity Assessment of Compacted Soil Liners, Waste Management of North America, Inc.

Rational Construction Quality Control Criteria for Compacted Soil Liners, University of Wisconsin Graduate School.

Final Cover Hydrologic Evaluation, Waste Management of North America, Inc.

Evaluation of Freezing and Thawing on the Hydraulic Conductivity of a Test Pad, Waste Management of Wisconsin, Inc.

Improved Design Methods for Landfill Final Covers, National Science Foundation.

Quality Assurance and Hydraulic Conductivity Assessment of Compacted Soil Liners, Waste Management of North America and Chemical Waste Management, Inc.

Hydrologic Analysis of a Co-Composting Landfill, Solid Waste Research Council, State of Wisconsin.

Sustainability and Sustainable Infrastructure

Center for Mineral and Metal Oxide Removal from Biomass (CMORE), Schmidt Sciences and the Foundation for Food & Agriculture Research, with Idaho National Laboratory, Iowa State University, University of Kansas, and Idaho State University.

Using Harvested Ash in Concrete and Cement Production, Electric Power Research Institute, Palo Alto, California.

Multi-University Center on Chemical Upcycling of Waste Plastics (CUWP), Office of Energy Efficiency and Renewable Energy US Department of Energy, with U. Wisconsin-Madison, U. Massachusetts, and Iowa State U.

Greenhouse Gas Emissions, Climate Change, and the Impacts of Climate Policy on the Global Coal Industry, Vigoris Coal Coalition LLP, Vancouver, BC.

Sustainability Assessment and Greenhouse Gas Implications of Envirocoal, Adaro Energy PT, Jakarta Indonesia.

Exchange Network for Expanded Polystyrene Bio-Shipping Containers, People, Prosperity, & Planet (P3) Program-Phase II, US Environmental Protection Agency

Exchange Network for Expanded Polystyrene Bio-Shipping Containers, People, Prosperity, & Planet (P3) Program-Phase I, US Environmental Protection Agency

Leaching from Roadways Constructed with Unencapsulated CCPs: Data Assessment & Synthesis, Electric Power Research Institute, with T. Edil.

Climate Change Mitigation and Adaptation in Dairy Production Systems of the Great Lakes Region, United States Department of Agriculture, National Institute of Food and Agriculture, with Matthew Ruark (PI) and others.

Recycled Materials Resource Center – Third Generation, Federal Highway Administration Pooled Fund, with T. Edil.

Recycled Materials Resource Center, Federal Highway Administration and United States Environmental Protection Agency, with K. Gardner

Environmental Benefits of Using Coal Combustion Products in Construction, Electric Power Research Institute, with T. Edil

Engineering Behavior of Recycled Unbound Materials, US Dept. of Transportation Pooled Fund, with T. Edil.

Assessing Environmental Impacts Associated with Bases and Subgrades Stabilized with Coal Combustion Products, Center for Freight and Infrastructure Research and Education, US Department of Transportation, with T. Edil.

User Guidelines for Waste and By-Product Materials in Highway Pavements, US Environmental Protection Agency, with A. Graettinger and J. Jambeck

Gravel Equivalency of Fly Ash Stabilized Reclaimed Roads, Minnesota Local Roads Research Board, with T. Edil

In Situ Stabilization of Gravel Roads with CCPs, Combustion Byproducts Recycling Consortium, US Dept. of Energy, with T. Edil

Leaching of Heavy Metals from Gray-Iron Foundry Slags Used in Geo Engineering Applications, Solid Waste Research Council, State of Wisconsin, with T. Edil.

Monitoring and Analysis of Leaching from Subbases Constructed with Industrial Byproducts, FHWA Recycled Materials Research Center, with T. Edil.

Ash Utilization in Low Volume Roads, Minnesota Department of Transportation, with T. Edil

Integrated Approach for Assessing Groundwater Impacts from Fly Ash Stabilized Soils, Alliant Energy, with T. Edil.

Geoenvironmental Assessment of Soft Soils Stabilized with High Carbon Fly Ashes, Solid Waste Research Program, State of Wisconsin, with T. Edil.

Are High Carbon Fly Ashes Effective Stabilizers for Soft Organic Soils?, National Science Foundation, with T. Edil.

Consortium for Beneficial Reuse of Fly Ashes, Alliant Energy, Northern States Power, and Mineral Solutions, Inc., with T. Edil.

Reuse of Fly Ash for Soil Stabilization, US Dept. of Energy, with T. Edil.

Field Demonstration of Earth Structures Constructed with Soil-Tire Chip Mixtures, Solid Waste Research Council, State of Wisconsin, with T. Edil.

Use of Foundry Sands in Hot Mix Asphalt, University Industrial Relations, with H. Bahia

Fly Ash Stabilization of Soft Subgrades, US Dept. of Energy, Mineral Solutions, Inc., and Alliant Power, with T. Edil.

Field Demonstration of Beneficial Reuse of Foundry Byproducts in Highway Subgrade, Wisconsin Department of Transportation, with T. Edil.

Properties of Foundry Sand Relevant to Design of Embankments and Retaining Wall Backfill, State of Wisconsin, Recycling Market Development Board, with T. Edil.

National Practice Survey: Beneficial Re-use of Waste Foundry Sands, State of Wisconsin Recycling Market Development Board, with T. Edil.

Using Waste Foundry Sands as Hydraulic Barriers, Solid Waste Research Council, State of Wisconsin, with T. Edil.

Field Assessment of Barrier Layers Constructed with Foundry Sands, Solid Waste Research Council, State of Wisconsin, with T. Edil.

Use of Shredded Waste Tires in Highway Construction, United States Environmental Protection Agency, with T. Edil.

Sub-base Replacement with Waste Foundry Sands, State of Wisconsin, Recycling Market Development Board, with T. Edil.

Using High Carbon Class F Fly Ash as a Lining Material: I-Laboratory Study, Solid Waste Research Council, State of Wisconsin, with T. Edil.

Using High Carbon Class F Fly Ash as a Lining Material: II-Field Verification, Solid Waste Research Council, State of Wisconsin, with T. Edil.

Reinforcement of Soils with Shredded Waste Tires, Solid Waste Research Council, State of Wisconsin, with P. Bosscher.

Use of Reclaimed Waste HDPE as Soil Reinforcement, Solid Waste Research Council, State of Wisconsin.

Groundwater

Leaching and Mobility of Per and Polyfluoroalkyl Substances (PFAS) from Concrete and Asphalt, Strategic Environmental Research and Development Program, US Dept. of Defense, with J. Guelfo and D. Kosson.

Sorption and Transport of Polycyclic Aromatic Hydrocarbons in Organoclays used for Permeable Adsorptive Barriers, CH2M Hill Inc. and Union Pacific Inc.

Environmental Impacts of Engineered Nanomaterials, Nanoscale Science and Engineering Center, National Science Foundation, with J. Pedersen and R. Hammers

Gray-Iron Foundry Slags as a Reactive Medium for Removing Arsenic from Ground Water and Drinking Water, Groundwater Research Advisory Council, State of Wisconsin, with D. Blowes.

Innovative Treatment of COPR Wastes in Coastal Areas, US Dept. of Transportation, with T. Edil.

Development of Large-Scale Application for Remediation of Chromium Ore Processing Residue, University Industrial Relations, University of Wisconsin, with T. Edil.

An Integrated Approach to Evaluating Environmental Impacts from Soils Stabilized with Fly Ashes, State of Wisconsin Recycling Program and Alliant Energy, Inc.

Uncertainty Based Design of Permeable Reactive Barriers, Wisconsin Ground Water Research Advisory Council, with G. Eykholt

Innovative Groundwater Treatment: Reactive Walls Constructed with Excess Foundry Sand, Wisconsin Groundwater Research Advisory Council, with G. Eykholt.

Development of Integrated Decision Support System for Wellhead Protection, Wisconsin Water Resources Council, State of Wisconsin.

Reducing Uncertainty in Subsurface Characterization, U.S. Department of Energy.

Ultrasonic Probe to Evaluate the Integrity of Borehole Seals, Federal Highway Administration, with T. Edil.

Field Assessment of Monitoring Well Seal Integrity, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

A Tool for Evaluating the Integrity of Monitoring Well Seals, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

Characterization of Air Plumes and Modeling Mass Removal During In Situ Air Sparging, Groundwater Research Advisory Council, State of Wisconsin, with G. Eykholt.

Education

Wisconsin-Puerto Rico Partnership for Research and Education in Materials [Wi(PR)EM], US National Science Foundation, with J. de Pablo, J. Pedersen, et al.

A Modular Geoenvironmental Curriculum, National Science Foundation, with other faculty from Wisconsin, Northwestern, Michigan, and Argonne National Laboratory.

Research Experience for Undergraduates Site, Geothermal and Energy Geotechnics, National Science Foundation, with J. Tinjum (PI), D. Fratta (co-PI), and S. Bradshaw.

Transforming CEE/GLE 330, Soil Mechanics, to Blended Learning, Division of Continuing Studies, University of Wisconsin-Madison.

Other Topics

Wisconsin Highway Research Program, Wisconsin Department of Transportation, with T. Edil.

Fate and Transport of Chronic Waste Disease Prions in Waste Water Treatment Plants, US Environmental Protection Agency

Stiffness and Stress State in Unsaturated Soils, Minnesota Department of Transportation, with T. Edil.

Thermal Conditions Below Highway Pavements During Winter, Wisconsin Department of Transportation, with P. Bosscher.

Design Protocols for Cellular Confinement with Geoweb, University Industrial Relations and Presto Products, Appleton, WI, with T. Edil.

Equivalency of Subgrade Improvement Methods, Wisconsin Department of Transportation, with T. Edil.

Reinforcement of Soft Subgrades with Geosynthetics, Wisconsin Department of Transportation, with T. Edil.

Evaluation of the DCP and SSG for Subgrade Evaluation, Wisconsin Department of Transportation, with T. Edil.

Shear Strength of Granular Backfill Materials, Wisconsin Department of Transportation, with T. Edil.

Correlating Index Properties and Engineering Behavior of Wisconsin Soils, Wisconsin Department of Transportation, with T. Edil.

Incorporating Alternative Subgrade Improvement Methods in Pavement Design, Wisconsin Department of Transportation, with T. Edil.

STEM TEACHER ENGAGEMENT

The following STEM teachers have been engaged in our research and educational programs through NSF's *Research Experience for Teachers* (RET) program:

Hayden, Matthew, Earth Science Teacher, Glacier Creek Middle School, Middleton-Cross Plains School District, Middleton, Wisconsin.

Kisting, Richard, Science Teacher, Badger Ridge Middle School, Verona Area School District, Verona, Wisconsin.

GRADUATE STUDENTS SUPERVISED

PhD Students

- Abichou, T., Hydraulic Properties of Foundry Sands, co-advised with T. Edil, 1999.
- Albrecht, B., Passive Dry Barriers: Air Circulation and Mass Transfer, 2001.
- Albright, W., Field Performance of Landfill Covers, 2005.
- Apiwantragoon, P., Alternative Covers: Field Performance and Modeling Methods, 2007.
- Bareither, C., Settlement of Bioreactor Landfills: Compression Mechanisms, co-advised with T. Edil, 2010.
- Breitmeyer, R., Unsaturated Hydraulic Properties of Solid Waste and Hydrology of Bioreactor Landfills, co-advised with T. Edil, 2010.
- Bin-Shafique, S., Leaching of Heavy Metals from Fly Ash Stabilized Soils, co-advised with T. Edil, 2002.
- Chalermyanont, T., Reliability Analysis of Mechanically Stabilized Earth (MSE) Walls, 2002.
- Chang, P., Geophysical Characterization of Water and Solute Movement in an Arid Climate, 2003, co-advised with D. Alumbaugh.
- Chen, J., Chemical Interactions between Coal Combustion Products and Geosynthetic Clay Liners, 2015.
- Elder, C., Effect of Heterogeneity on Performance of Permeable Reactive Barriers, 2000.
- Eun, J., Diffusive Transport of Organic Compounds in Liquid and Gas Phases through Co-Extruded EVOH Geomembranes, with J. Tinjum, 2014.
- Foose, G., Leakage Rates and Chemical Transport Through Composite Landfill Liners, co-advised with T. Edil, 1997.
- Gulec, S., Compatibility of Geosynthetics and Mine Waste Liquids, co-advised with T. Edil, 2003.
- Gustitus, S. Accelerated Degradation and Service Life Prediction of Bentonite-Polymer Composite GCLs, 2021.
- Hunter, E., Sorption of Radionuclides in Engineered Barrier Materials, with J. Tinjum, 2014.
- Jo, H., Fundamental Factors Affecting Interactions Between Bentonite and Inorganic Liquids, 2003.
- Khire, M., Field Hydrology and Water Balance Modeling of Earthen Final Covers for Waste Containment, 1995.
- Kim, H., Oxygen Transport Through Multi-Layer Caps Over Mine Waste, 2000.
- Kim, W., Alternative Subgrades Stabilization with Geosynthetics, co-advised with T. Edil, 2003.
- Komonweeraket, K., Mechanisms Controlling Release of Trace Elements from Soils Stabilized with Fly Ash, co-advised with T. Edil, 2010.
- Lee, T., Using Waste Foundry Sands as Reactive Media in Permeable Reactive Barriers, 2002.
- Li, L., Impacts of Mineralogical Fouling of Permeable Reactive Barriers in Heterogeneous Environments, 2004.
- Nokkaew, K., Unsaturated Hydraulic Behavior of Recycled Base Course Materials, co-advised with J. Tinjum, 2014.
- Othman, M., Effect of Freeze/Thaw on the Structure and Hydraulic Conductivity of Compacted Clays, 1992.
- Park, M., Transport of VOCs in Composite Landfill Liners, co-advised with T. Edil, 2011.
- Scalia, J., Bentonite-Polymer Nanocomposites for Environmental Containment, 2012.
- Tachavises, C., Flow Rates Past Vertical Groundwater Cut-Off Walls: Influential Factors and Their Impact on Wall Selection, 1998.

Tanyu, B., Equivalency of Alternative Subgrade Stabilization Methods, co-advised with T. Edil, 2003.
Tian, K., Life Expectancy of Geomembranes Used in Low-Level Radioactive Waste Containment, 2015.
Tinjum, J., Innovative Remedial Treatment of Chromium Ore Processing Residues, co-advised with T. Edil, 2006.
Yesiller, N., Ultrasonic Evaluation of Cased Borehole Seals, 1994, co-advised with T. Edil.
Yu, T., Effect of PFAS on Effectiveness of Landfill Liner Systems, 2023, in progress.

MS Students

Abichou, T., Field Evaluation of Geosynthetic Insulation for Protection of Clay Liners, 1993.
Abu Hassanein, Z., Using Electrical Resistivity Measurement as a Quality Control Tool for Compacted Clay Liners, 1994.
Acosta, H., Stabilization of Soft Subgrade Soils Using Fly Ash, with T. Edil, 2002.
Albrecht, B., Effect of Desiccation on Hydraulic Conductivity of Compacted Clays, 1995.
Akpinar, M., Interface Shear Strength of Geomembranes and Geotextiles at Different Temperatures, 1997.
Bahner, E., Soil Nailing Case Histories in Wisconsin, 1993.
Baker, D., Physical Modeling of In Situ Air Sparging, 1996.
Bareither, C., Geological Controls on the Shear Strength of Wisconsin Sands, with T. Edil, 2006.
Basantis, A., Hydraulic Properties of Sluiced Coal Ashes, 2021.
Bashel, M., Flow Rates in Composite Landfill Liners, 1993.
Baugh, J., Fly Ash Stabilization of Gravelly Soils, with T. Edil, 2008.
Benavides, J. Marie, Hydrologic Predictions for Coal Combustion Products Disposal Facilities, did not finish thesis.
Beuermann, S., Dielectric Sensor for Measuring Suction in Dry Soils, 1999.
Bohnhoff, G., Predicting the Water Balance of Alternative Covers Using UNSAT-H, 2005.
Bozyurt, O., Effect of Deleterious Materials on the Mechanical Properties of RAP and RCA, with T. Edil, 2011.
Bradshaw, S., Effects of Stress, Hydration, and Ion Exchange on Geosynthetic Clay Liners, 2008.
Bridstrup, J., Transport of Polyfluorinated Compounds Through Engineered Barrier Materials, 2020.
Brown, B., Leaching of Trace Elements from Roadways Constructed with CCPs, 2015.
Camacho, L., Analysis of Landfill Failure Using Three-Dimensional Limit Equilibrium Methods, with T. Edil, 2002.
Camargo, F., Equivalency of Fly-Ash Stabilized RPM and Gravel Base Course, with T. Edil, 2008.
Chen, C., Meteorological Conditions for Design of Monolithic Alternative Earthen Final Covers (AEFCs), 1999.
Chiang, I., Effect of Fines and Gradation on Soil Water Characteristic Curves of Sands, 1998.
Christman, M., Annular Well Seals: A Geophysical Study of Influential Factors and Seal Quality, with T. Edil, 1999.
Cope, D., Treating TCE-Contaminated Groundwater with Gray-Iron Slag, 2007.
Cooper, S., An Evaluation of How Subsurface Characterization Using Soil Classifications Affects Predictions of Containment Transport, 1993.
Dingrando, J., Beneficial Reuse of Foundry Sands in Controlled Low Strength Material, with T. Edil, 1999.
Eberhardt, M., Leaching of Heavy Metals from Gray-Iron Slags with and without Carbonation, 2008.

- Elder, C., Modeling Mass Transfer During In Situ Air Sparging, 1996.
- Foose, G., Shear Strength of Sand Reinforced with Shredded Waste Tires, 1993.
- Gavin, M., Physical and Chemical Effects of Electroosmosis on Kaolinite, with T. Edil, 1997.
- Genthe, D., Shear Strength of Two Pulp and Paper Mill Sludges with Low Solids Content, 1993.
- Gibson, S., Geoelectric Methods to Evaluate Borehole Seals, with T. Edil, 1999.
- Goodhue, M., Reuse of Foundry Sands in Reinforced Earthen Structures, with T. Edil, 1998.
- Gurdal, T., Unsaturated Hydraulic Properties of Alternative Cover Soils, 2003.
- Hardianto, F., Representative Sample Size for Hydraulic Conductivity of Compacted Clay, 1993.
- Harrick, M., Permeable Reactive Walls in Wisconsin, 1994.
- Hill, T., Field and Laboratory Hydraulic Conductivity of Compacted Mine Waste Rock, 1997.
- Jo, H., Chemical Compatibility of Non-Prehydrated GCLs and Inorganic Liquids, 1999.
- Jong, D., Load Limit Timings for Roadways Exposed to Frost, 1997.
- Kim, K., Water Content Reflectometer Calibrations for Final Cover Soils, 2002.
- Kircher, J., Modeling Chemical and Physical Effects of Electro-osmosis on Kaolinite, with T. Edil, 1997.
- Klett, N., Evaluation of VOC Discharges to Groundwater from Engineered Landfills in Wisconsin, with T. Edil, 2005.
- Kolstad, D., Hydraulic Conductivity and Ion Exchange in GCLs Permeated with Multispecies Inorganic Solution, 2000.
- Kleven, J., Mechanical Properties of Excess Foundry System Sand and an Evaluation of its use in Roadway Structural Fill, with T. Edil, 1997.
- Klima, J., Field Assessment of Monitoring and Water Supply Well Seals, with T. Edil, 1996.
- Kraus, J., Hydraulic Conductivity of Papermill Sludges, 1994.
- Kucukkirca, I., In-Service Properties of Geosynthetic Materials Exhumed from Landfill Final Covers, with J. Tinjum, 2009.
- Lanier, A., VOC Transport in Geosynthetic Clay Liners, 2002.
- Lane, D., Hydrologic Observations and Modeling Assessments of Landfill Covers, 1992.
- Lau, W., Use of Geocells in Flexible Pavements Over Poor Subgrades, with T. Edil, 2001.
- Lee, T., Physical Modeling of Vertical Groundwater Cut-Off Walls, 1999.
- Lin, L.C., Effect of Wet-Dry Cycling on Swelling and Hydraulic Conductivity of Geosynthetic Clay Liners, 1998.
- Marchesi, I., Simulating the Hydrology of Alternative Covers with *SoilCover*, 2002.
- Maxwell, S., Geosynthetic Reinforcement of Soft Subgrades, with T. Edil, 1999.
- Meer, S., Effects of Ion Exchange and Desiccation on GCLs used in Final Covers, 2003.
- Meerdink, J., Unsaturated Hydraulic Conductivity of Barrier Soils Used for Final Covers, 1994.
- Mengelt, M., Effect of Cellular Confinement on Soil Stiffness Under Dynamic Loads, with T. Edil, 2000.
- Mergener, E., Assessing Clogging of Permeable Reactive Barriers in Heterogeneous Aquifers Using a Geochemical Model, 2002.
- Metz, S., Gray-Iron Slags as a Reactive Medium for Arsenic Treatment, 2007.
- Nelson, M., Laboratory Hydraulic Conductivity Testing Protocols for Paper Sludges in Barrier Layers, 2001.
- Olson, R., Source and Prevention Strategies for Black Goo in Landfills, Summer 2023.
- Palmer, B., High Carbon Class F Fly Ash for Reactive Barrier Landfill Liners, with T. Edil, 1995.
- Payne, L., Use of Pulsating Electro-Osmosis in Barrier Applications, with T. Edil, 1995.
- Rauen, T., Effect of Bioreactor Leachate on Geosynthetic Clay Liners, 2007.
- Pekarun, O., Evaluation of Hydraulic Significance of Defects in Annular Well Seals, with T. Edil, 1994.

- Rochford, W., Effectiveness of Geomembrane and Soil-Bentonite Cut-Off Walls, 2002.
- Roesler, A., Field Hydrology and Model Predictions for Final Covers in the Alternative Assessment Program, 2002.
- Rosa, M., Effect of Freeze-Thaw Cycling on Resilient Modulus of Fly-Ash Stabilized Subgrade Soils, with T. Edil, 2006.
- Sauer, J., Leaching of Heavy Metals from Organic Soils Stabilized with High Carbon Fly Ashes, with T. Edil, 2005.
- Sajjad, M., Effect of Electro-Osmosis on Hydraulic Conductivity of Compacted Clay, 1993.
- Scalia, J., Hydraulic Conductivity of Geosynthetic Clay Liners Used in Composite Final Covers, 2009.
- Schlicht, P., Weathering-Induced Alterations in the Hydraulic Properties of Final Covers for Waste Containment, with J. Tinjum, 2009.
- Setz, M., Ammonia exchange in Na-Bentonites Used for Waste Containment, 2013.
- Simon, D., Comparison of Three Geophysical Imaging Techniques for Characterization of an IAS Plume, with D. Alumbaugh, 2001.
- Smith, C., Coupling Hydrology and Erosion Control Design for Final Covers for Low-Level Radioactive Waste Containment, 2011.
- Stefani, Nicholas, Field Evaluation of Radon Flux from Historic Uranium Mill Tailings Disposal Facilities, 2016.
- Suwansawat, V., Using TDR for Moisture Movement in Clays, 1997.
- Tan, Y., PFAS Transport through Engineered Barriers for Waste Containment, Webinr2024.
- Tastan, O., Stabilizing Organic Soils with High Carbon Fly Ashes, with T. Edil, 2005.
- Tatliso, N., Using Tire Chips in Earthen Structures, with T. Edil, 1995.
- Thorstad, P., Field Performance of a Geosynthetic Clay Liner (GCL) Used as the Hydraulic Barrier Layer in a Landfill Cover in Southwestern Wisconsin, 2002.
- Tian, K., Leachate Chemistry and Geomembrane Durability in Low-Level Radioactive Waste Containment, 2012.
- Trast, J., Field Hydraulic Conductivity of Thirteen Compacted Clay Liners, 1993.
- Tinjum, J., Soil Water Characteristic Curves for Compacted Fine Grained Soils, 1995.
- Trzebiatowski, B., Effect of Pedogenesis on Soil Water Characteristic Curves of Cover Soils, 2004.
- Vasko, S., Hydraulic Conductivity of Prehydrated Geosynthetic Clay Liners Permeated with Calcium Chloride Solutions, 1999.
- Wang, X., Evaluating Suction Head at the Wetting Front During Infiltration in Compacted Clays, 1993.
- Williams, Thomas, Engineering Properties of a Composite Barrier System Exposed for a Decade, 2018.
- Winkler, W., Thickness of Monolithic Covers in Arid and Semi-Arid Climates, 1999.
- Woodward, N., Life Expectancy of Geosynthetic Materials Used in Low-Level Radioactive Waste Containment, with J. Tinjum, 2011.
- Zangl, F., Impact of Cyclic Dehydration on Bentonite-Polymer Nanocomposites Used for Waste Containment, with W. Likos, 2014.

EDITORSHIPS

Editor-in-Chief, ASCE *Journal of Geotechnical and Geoenvironmental Engineering*, 2004-2006

Editor, ASCE *Journal of Geotechnical and Geoenvironmental Engineering*, 1996-99

Editorial Board, *Journal of Geotextiles and Geomembranes*, 2009-2021.

Editorial Board, *Environmental Geotechnics J.*, 2014-2021.

Editorial Board, *Coal Combustion and Gasification Products J.*, Asst. Editor, 2017-present.

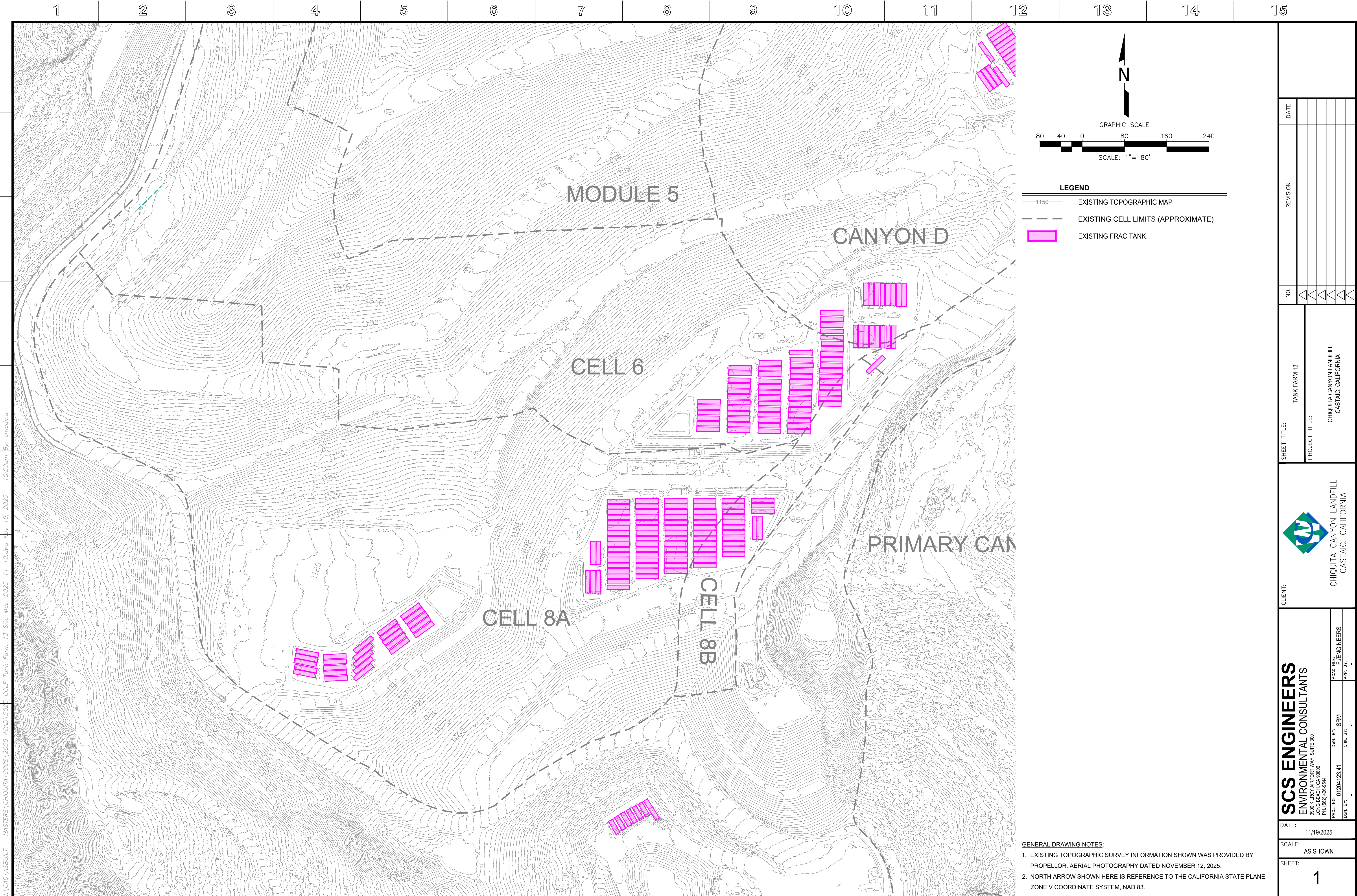
Co-Editor, *Waste Containment and Remediation*, GSP No. 142, ASCE, A. Alshawabkeh et al., co-editors, 2005.

Editor, *Risk-Based Corrective Action and Brownfields Restorations*, GSP No. 82, ASCE, J. Meegoda, R. Gilbert, and S. Clemence, co-editors, 1998

Co-Editor, Environmental Geotechnics Section, *Geotechnical News*, 1994-1996

Co-Editor, Special Issue on Innovations in Solid Waste Engineering and Management: The 2008 Global Waste Management Symposium, *J. of Environmental Engineering*, M. Barlaz, co-editor, 136(8), 2010.

ATTACHMENT C



N:\CAD\ASBUILT - MASTERS\CHIQUITA\CCCS\2025 ACAD\2025 CCLF Tank Farm 13 Sit Map_2025-11-19.dwg Nov 19, 2025 - 10:29am By: smedina

SCS ENGINEERS ENVIRONMENTAL CONSULTANTS 3500 ALVARADO BLVD, SUITE 300 LONG BEACH, CA 90806 PH: (562) 426-9544		CLIENT:  CHIQUITA CANYON LANDFILL CASTAIC, CALIFORNIA		SHEET TITLE: TANK FARM 13 PROJECT TITLE: CHIQUITA CANYON LANDFILL CASTAIC, CALIFORNIA		NO. 1 2 3 4 5 6		REVISION		DATE	
DATE: 11/19/2025		SCALE: AS SHOWN		SHEET: 1							

ATTACHMENT D

Evaluation of Reaction Caused Surface Settlement:

May 18, 2023, through
May 21, 2025

Prepared For:



Blue Ridge Services Montana, Inc.
P.O. Box 1945
Hamilton, MT 59840
Telephone: (406) 370-8544



September 15, 2025

CONTENTS

Acronyms 1

Background..... 1

Executive Summary..... 2

Goals..... 5

Methodology..... 6

 Settlement..... 6

 Initial Compaction Density 6

 Waste Type 6

 Physical Loading 6

 Biological Decomposition 7

 Chemical Processes..... 7

Baseline Settlement 8

Detailed Site Settlement Analysis..... 12

Total Settlement: North Half 14

Rate of Change 14

 Cumulative Average..... 16

 3-Month Rolling Average 16

Conclusion 17

ACRONYMS

Acronym	Meaning
AQMD	South Coast Air Quality Management District
BRS	Blue Ridge Services Montana, Inc.
CCL	Chiquita Canyon Landfill
ETLF	Elevated Temperature Landfill
GCCS	Gas Collection and Control System
LFG	Landfill Gas
MSW	Municipal Solid Waste
RA-AQMD	Reaction Area as defined by AQMD
RA-Data	Reaction Area as defined by Reaction Committee using Data
SEM	Surface Emission Monitoring for Landfill Gas

BACKGROUND

The Chiquita Canyon Landfill (CCL or Landfill) is a municipal solid waste (MSW) landfill located in northern Los Angeles County. A portion of the Landfill is experiencing a subsurface reaction also known as an Elevated Temperature Landfill (ETLF) event. While all landfills experience surface settlement due to normal decomposition of waste, ETLF events cause accelerated decomposition often resulting in increases to a landfill's settlement rate, heat generation, and liquid levels.

Chiquita continues to diligently monitor the status of the reaction, particularly in terms of its location and whether it is expanding laterally. Simultaneously, CCL continues its efforts to mitigate the effects of the ETLF event, by extracting landfill gas (LFG) and leachate from within and around the RA-Data at unprecedented rates.

While there are many criteria used to delineate the physical boundary of the reaction, this Surface Settlement Study addresses one of them – settlement.

This Surface Settlement Study was conducted by Blue Ridge Services Montana, Inc. (BRS), under the direction of Neal Bolton, P.E. Mr. Bolton is president of Blue Ridge Services Montana, Inc. (BRS) and is a national expert in landfill operations. He serves on the Reaction Committee as the subject matter expert in landfill design and operational best management practices pursuant to Condition No. 12(a)(i) of the Stipulated Order for Abatement with the South Coast Air Quality Management District (AQMD) in Case No. 6177-4 (SOFA). He has provided various consulting support to Chiquita since 2020, including being part of the consulting team that resolved the working face odor issue in 2022. Additionally, he has broad operational experience within the heavy construction and solid waste industry that spans more than 47 years, during which time he has provided operational support for more than 500 landfills throughout North America and abroad.

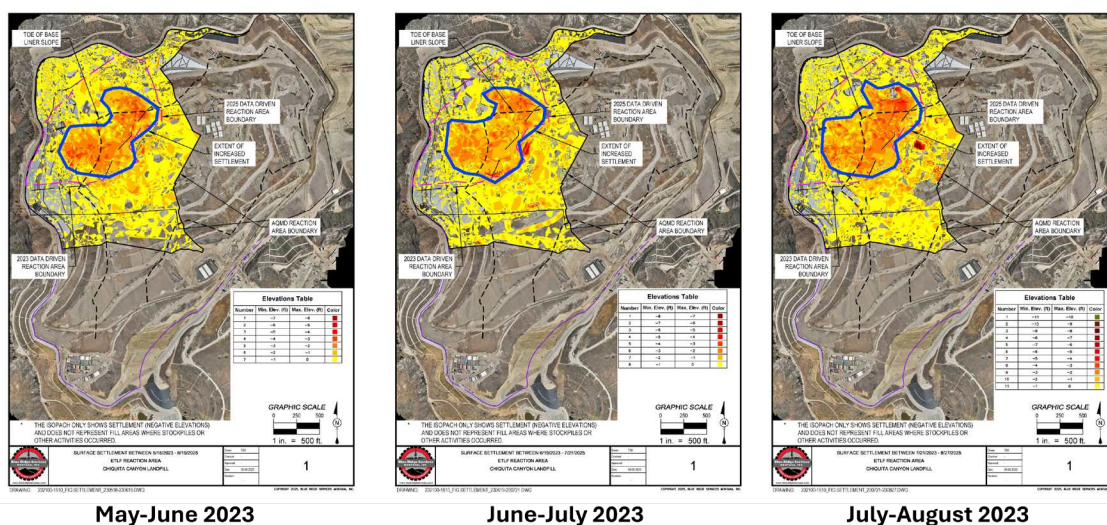
In this report, BRS analyzed surface settlement at CCL over a 2-year period between May 18, 2023, and May 21, 2025. The start date of May 18, 2023, was chosen because that date was the earliest date with Propeller¹ drone mapping data where no MSW fill activity occurred within the RA-Data of the Landfill. All subsequent fill activity was limited to reaction mitigation efforts involving the placement of cover material, re-grading, material stockpiling, and localized construction.

EXECUTIVE SUMMARY

There were two primary goals of this study. The first was to identify areas of accelerated settlement that can be directly attributed to the ETLF event. The second was to quantify the rate of change of settlement to ascertain if the reaction is accelerating or decelerating vertically and/or laterally - and if so in what direction(s).

The results of this settlement study indicate that the reaction is slowing. Initially, in early 2023, the rate of change in terms of settlement was increasing – it was accelerating. This acceleration was a clear and obvious indicator that the subsurface reaction was occurring. At its peak, settlement within the RA-Data was occurring at an annualized rate of nearly 8% per year. Please note that we have expressed this at an annual rate, even though the period of peak acceleration lasted only a few months.

The location of the rapidly accelerating settlement was first observed within the eastern third of the current RA-Data as defined by the Reaction Committee. This acceleration is shown by the areas outlined by the blue line in the following three isopach's (See Figure 1). This shows the accelerated



Initial Reaction Settlement

Figure 1

¹ Propeller is a third-party service provider of onsite drone mapping equipment and software. CCL utilizes Propeller to provide high quality topographic mapping of the Landfill's surface on an as-needed basis.

settlement that occurred during the first three months from the start of our 2-year analysis. This appears to show the general starting area of the reaction.

As seen in Figure 1, the reaction was progressively expanding mostly to the west and northwest. This was supported by field evidence of high liquid levels, elevated temperatures, and general highly decomposed waste characteristics observed in drilling spoils and material excavated during the West Toe Project and the North Slope Termination Project.

While the rate of change of settlement across the northwest portion of CCL increased above baseline, the highest rate of change occurred within the red-shaded RA-Data boundary. Accelerated settlement rates were also observed in the adjacent area within the tan-shaded AQMD defined reaction area (RA-AQMD), but the rates were not as high as within RA-Data (See Figure 2). For reference, these two areas, along with the non-reaction area green-shaded area.

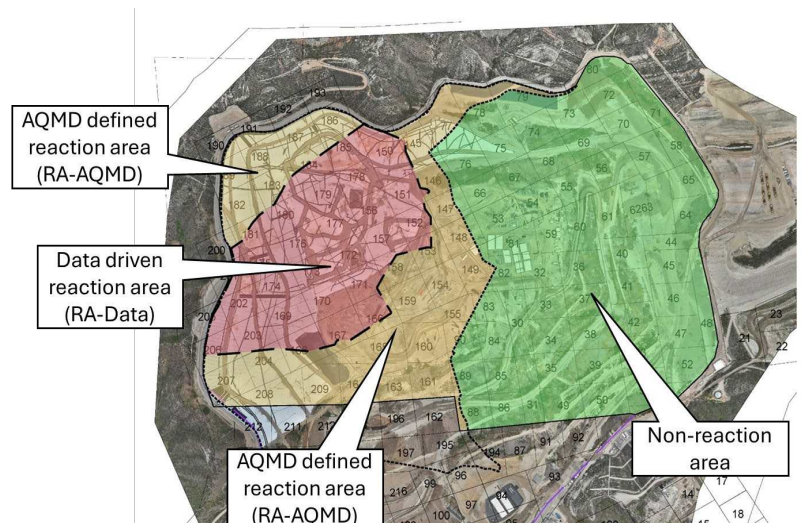


Figure 2

Our settlement analysis indicates that areas adjacent to the RA-Data boundary also showed increased settlement due to collateral impacts of the reaction.

These collateral impacts include the lateral migration of heat, LFG, and leachate that is being generated by the reaction. However, the rate of settlement in those adjacent areas is much less than was observed within the RA-Data. Accordingly, it is important to note that while above normal settlement is still occurring within and adjacent to the RA-Data boundary, the rate of change over time is slowing – it is decelerating.

Surface Settlement Analysis: May 18, 2023, through May 21, 2025

These charts (See Figure 3) show the average annualized rate of change of settlement within the RA-Data and RA-AQMD respectively (See the right-hand vertical axis on each chart). The months with the highest rate of change within RA-Data were March 2024 and December 2024 when annualized settlement approached 8%.

As simply a point of reference, both charts show the daily rate of settlement and the annualized – or yearly – rate of settlement.

It is important to note the trendline for the changing rate of settlement. In both cases, the trendline reached its peak in September 2024 and has since been declining. This diminishing rate of settlement indicates that the reaction is slowing, rather than expanding. This also implies that CCL's efforts related to liquid and gas removal are effective in mitigating the reaction.

As evidenced by the combined data (See Figure 4), the RA-Data area has always exhibited a faster rate of settlement, which is expected in the portion of Landfill that is experiencing the ETLF event. The surrounding area, the RA-AQMD area, by nature of being in proximity to the RA-Data area, also experienced increased settlement prior to September 2024.

However, as noted by the data, the rate of change of settlement in the RA-AQMD area has always been substantially slower than that in the RA-Data

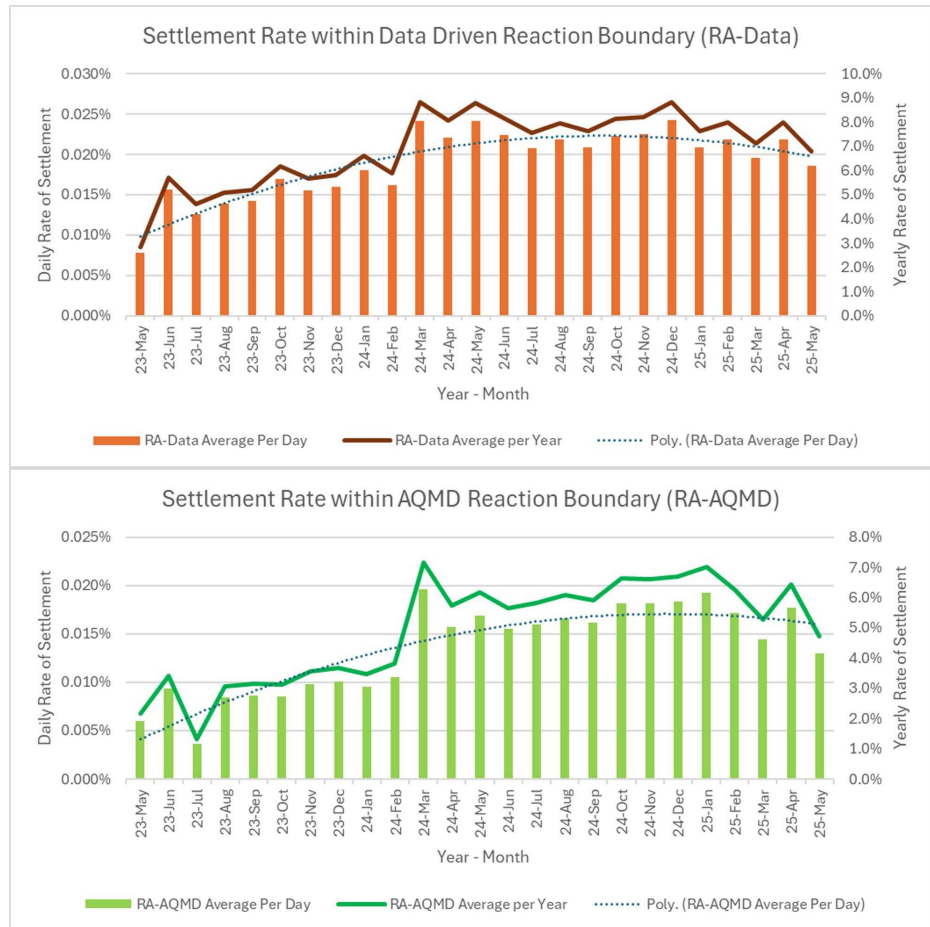


Figure 3

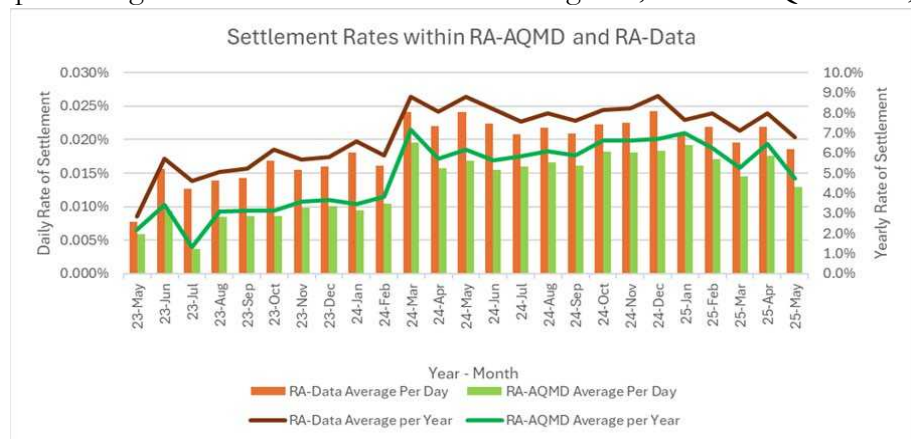


Figure 4

area, demonstrating the difference between the true area of CCL being impacted by the reaction and the areas adjacent thereto.

Settlement in the areas adjacent to the RA-Data area is likely caused by the effect of the reaction where the waste mass in proximity to it is influenced by the collapse of the subsurface reaction area and shown here as the zone of greatest settlement. Adjacent settlement is also attributed to the lateral transfer of LFG, heat, and liberated leachate that radiates outward from the RA-Data (See Figure 5).

In summary, while settlement is evident outside the RA-Data boundary, it has been observed at the same rate as within the RA-Data area. More importantly, the rate of settlement across the northwest portion of the Landfill is slowing – it is decelerating.

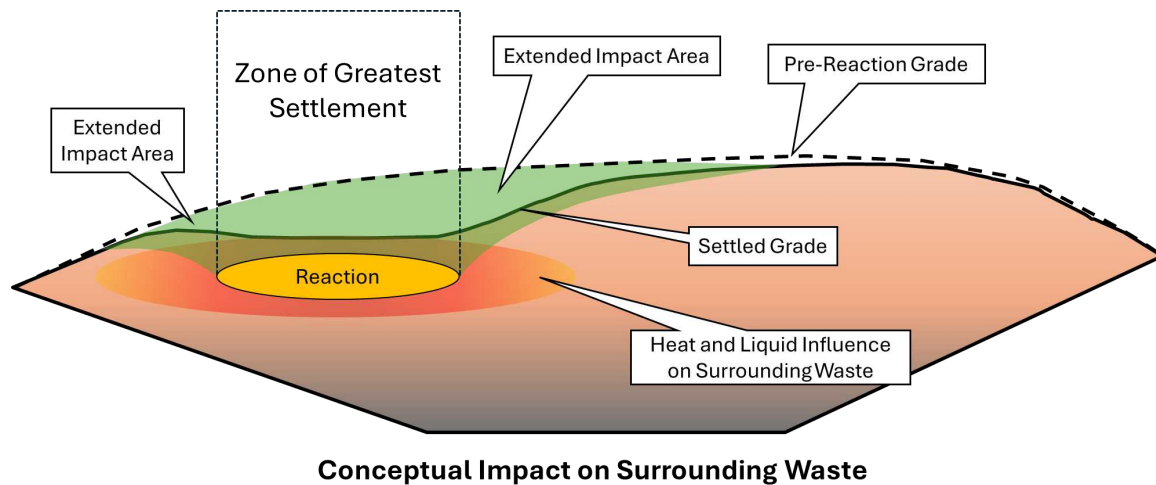


Figure 5

GOALS

There were two primary goals of this study. The first was to identify areas of accelerated settlement that can be directly attributed to the ETLF event. The second was to quantify the rate of change of settlement to ascertain if the reaction is accelerating or decelerating vertically and/or laterally - and if so in what direction(s).

Most landfills measure settlement in terms of depth settled per time (e.g., 3 feet per year), or as a percentage of depth per time (e.g., 1.5% per year). However, to accurately quantify how the reaction is changing, we evaluated the rate of change in terms of percentage rate of settlement over time. The percentage of settlement is more accurate when evaluating change on a portion of the Landfill that ranges from 0 feet to over 300 feet in depth. Further, evaluating percentage settlement in terms of “rate of change” allowed us to identify settlement trends over time, even when the multiple topographic maps covered varying time intervals.

It should be noted that settlement alone does not necessarily define the RA-Data area. In fact, there are many more criteria that the Reaction Committee continually evaluates in determining RA-Data.

These additional criteria are defined in the Reaction Committee's boundary determination submitted on September 9, 2025. These criteria include, without limitation, wellhead temperatures, down-well leachate liquid temperatures, liquid levels, LFG composition, and LFG surface emission monitoring (SEM) results.

METHODOLOGY

Settlement

Settlement occurs at all landfills to varying degrees and is the result of several interrelated factors, which we examine, in turn, below.

Initial Compaction Density

Landfills that achieve a high rate of compaction density during initial waste placement will generally see less incremental settlement after placement, though they may achieve a greater ultimate settlement. Operational practices at the CCL historically in-placed waste at a density that exceeded normal industry standard practice. Consequently, by achieving a higher rate of compaction density during initial waste placement, we would expect to see more gradual settlement per year, with an ultimate density above that achieved by the typical landfill.

Waste Type

Most of the settlement that occurs at landfills results from organic material breaking down through biological decomposition and physical deformation. Thus, it follows that landfills that receive a higher percentage of organic material will settle more and settle faster. However, even inert materials within a landfill will break down physically and as it does, smaller pieces of waste will tend to move downward to fill in the voids that may exist in between coarse, bulky material.

Physical Loading

The waste mass in every landfill is supported by the physical structure of the waste itself. Even paper and cardboard can provide small, almost microscopic trusses, while larger items like poles and lumber can create a complex system of beams, columns, and trusses the help support the waste mass.

Over time, those supporting structures in the landfill's waste mass are impacted by the loading (weight) of subsequent overlying layers of material (waste and soil). That loading, along with the processes of creep, deformation, and compression, will eventually cause the supporting structure of the waste mass to gradually lose strength and fail, thereby allowing the landfill to settle. Other factors like increasing moisture content and decomposition will exacerbate the loss of physical strength. For example, cellulose fibers that are present in wood, brush, cardboard and other materials will decompose and soften over time.

Biological Decomposition

All organics within the Landfill are at some state of decomposing. In the process, solid organic material is converted into gas. This process of biological decomposition is normal. However, in the case of the ETLF portion of the Landfill, biological decomposition is quite accelerated, resulting in rapid liberation of LFG, liquid leachate, and associated settlement.

Chemical Processes

Within all landfills, there are also chemical processes that will weaken the internal supporting structures leading to a loss of support and eventual settlement. Ferrous metal will rust (i.e., oxidize) over time and whatever support was initially provided by those items will be lost.

The amount of settlement, and time period over which it occurs is generally predictable at most landfills, but not at landfills that are experiencing ETLF conditions.

Also, the ultimate settlement at any landfill, including CCL, and the time required to settle is very dependent on the overall depth of waste. The greater the overall depth of waste, the greater the loading on lower layers, and thus the greater the degree of settlement. This can be exacerbated during ETLF conditions due to the higher temperatures and the increased liberation of liquid leachate.

Consequently, even though waste may have been placed at a constant density during the operational phases of the Landfill, the lower portions of the waste column will become denser as additional layers (i.e., loading) are placed. This is shown conceptually in Figure 6 where we can see the first layer (at time 0) is placed at a certain density, and it consumes a specific depth of landfill airspace. However, as subsequent layers are stacked on top, and even though each new layer is placed at the same density and consumes a similar depth of airspace, the underlying layers become progressively more compressed (e.g., denser). Consequently, the lower layers, which have the greatest loading, receive the greatest loading and therefore achieve the highest density.

Settlement is typically quantified by either overall settlement depth measured in an elevation change or as a percentage of settlement. The percentage of settlement is calculated by dividing the measured depth of settlement by the depth of the underlying waste prior to settlement occurring. Both can be presented for a specific interval of time such as annually, or the total timeframe of the site such as lifetime ultimate settlement.

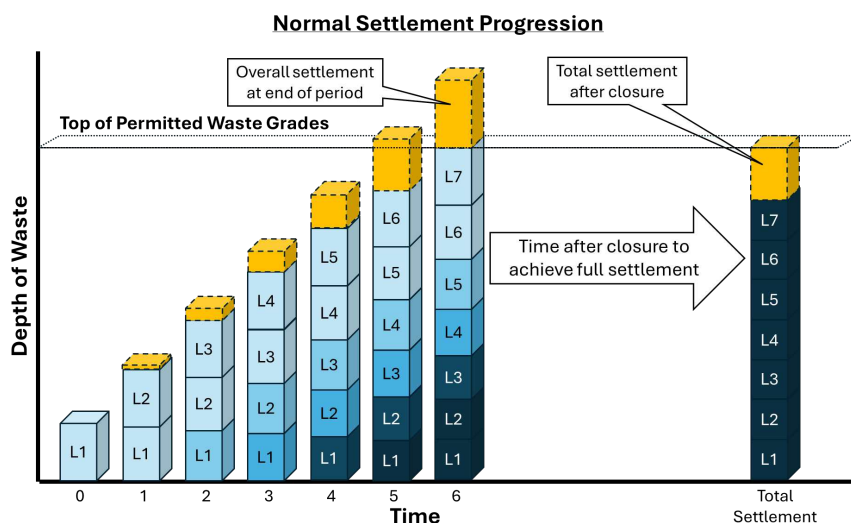
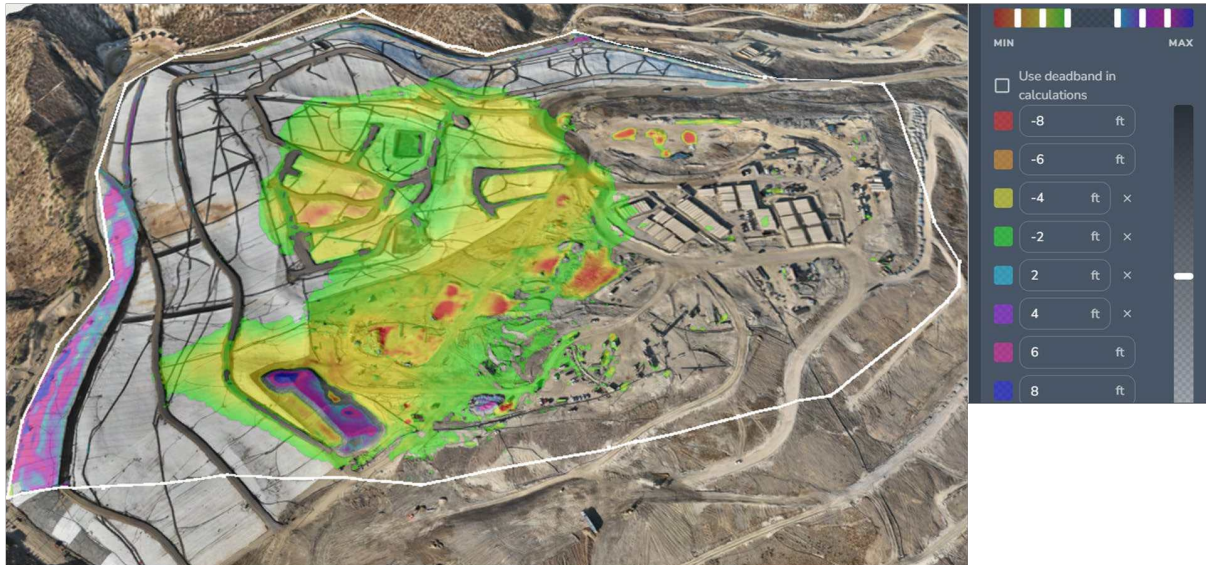


Figure 6

Both methods require a before and after topographic map of the Landfill.

CCL continues to create and submit a monthly isopach map to several regulatory agencies which show an isopach image of settlement across a specific portion of the Landfill. Those isopach maps use various colors to illustrate the degree of settlement in specific areas. This is measured in feet and provides a visual representation of where and how much the surface topography has settled as is shown in Figure 7.

Chiquita Canyon Landfill - Isopach



January 3, 2025 Survey Image. October 2, 2024 vs January 3, 2025

Figure 7

Baseline Settlement

Every landfill settles over time, but as previously noted, the rate of settlement varies from one landfill to another. To identify and quantify surface settlement caused directly and/or indirectly by the ETLF reaction, we had to establish a baseline settlement rate that applied specifically to CCL and which was outside the RA-Data.

It is important to note that unlike overall settlement measured in elevation change, the rate of change is influenced by the depth of waste in relation to a period of time. Because it is measured by the elevation change divided by the depth of waste prior to settlement occurring, the rate of change in shallow waste can be more than in deeper waste as Figure 8 shows. This is evident in the isopach maps in later sections of this report.

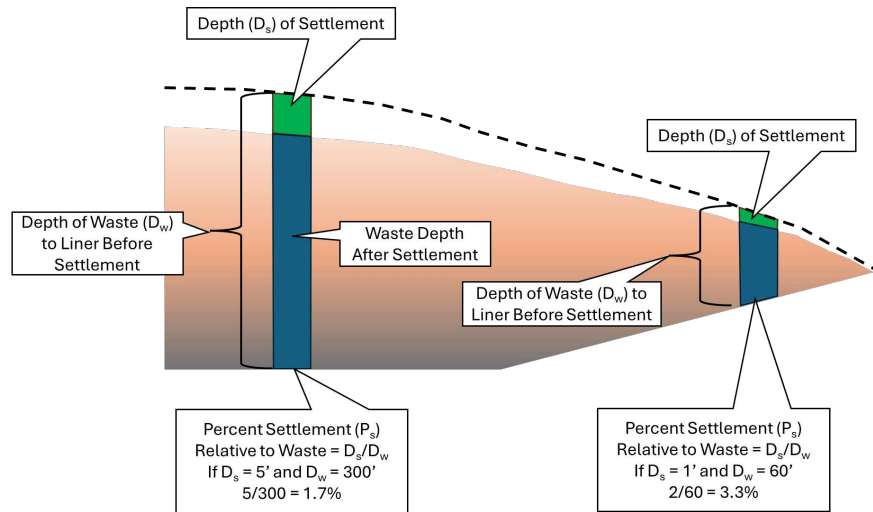


Figure 8

The portion of CCL we selected for our settlement baseline was in the southeast portion of the Landfill (See Figure 9). This area was chosen because it was furthest from the RA-Data and had not recently received any new waste (from 2021-2025).

The initial baseline analysis area (the blue boundary) had a grid of sample points every 50 feet, providing 850 points on a 50-foot grid pattern. From this area we extracted annual elevation points over a 4-year period.

However, under closer inspection and after pulling those points into CAD and Excel, we discovered that there were areas where some localized activity occurred within the four-year period. Consequently, we reduced the area from 850 points to 324 points where there was less significant change to the topography year-to-year. This area, with its 324 points (within the green boundary) was used as our non-reaction baseline for defining typical settlement.

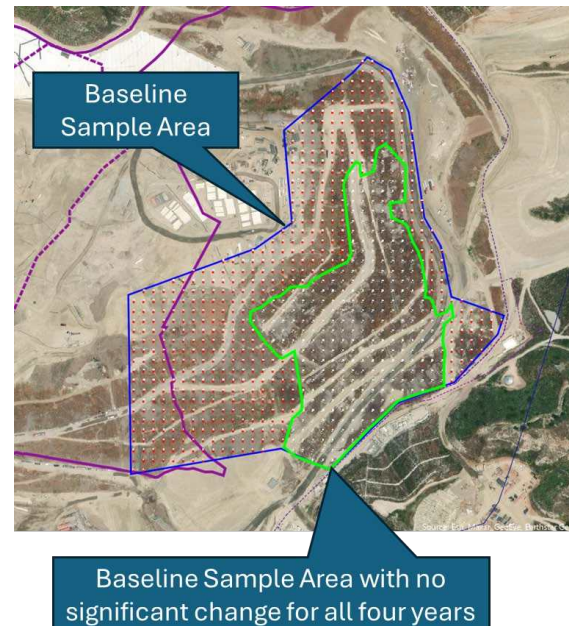


Figure 9

Surface elevations for each of those 4 years were recorded for each of those 324 points resulting in a total of 1,296 elevation data points.

Using the elevation data points, we measured the elevation change between each year's topographic mapping. Because some minor grading (i.e., cutting and filling) activities did occur within the final dataset, there were some outliers in terms of year-to-year settlement. To address those elevation anomalies, we eliminated the upper and lower 2% of the points. A total of 50 points were eliminated, leaving a remainder of 1,246 points for our baseline settlement calculation.

Surface Settlement Analysis: May 18, 2023, through May 21, 2025

All elevations were then evaluated in a scatter plot showing the annual change in elevation relative to the depth of waste at the start of the year (See Figure 10). This data showed a clear pattern of settlement that was in line with industry standards. Please note that in our calculations, we began by calculating daily percentage settlement to account for topographic maps that ranged from weekly to monthly. Then, we standardized all settlement results by converting them to an annualized percentage settlement based on total waste depth.

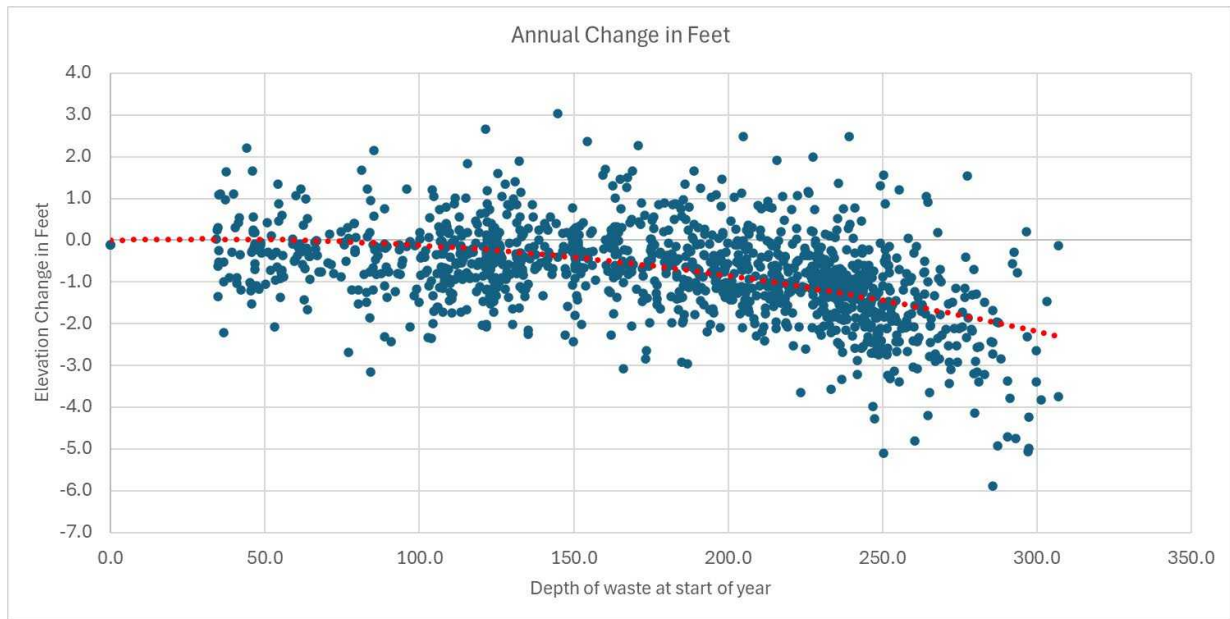


Figure 10

Please note that along with the settlement data which is shown as a negative value (in feet), there are certain areas that show positive values, which indicate localized fill activity or potentially some error in topographical mapping. During our review of the topographic maps over that four-year period, we determined that many of those areas that showed up as fill were in fact related to road maintenance, slope repair, and placement and removal of stockpiled material.

Surface Settlement Analysis: May 18, 2023, through May 21, 2025

Finally, to help quantify the time component regarding settlement, we showed the average annual settlement percentage for the entire baseline area. The annualized rate of change (i.e., percentage settlement) appeared to be in line with industry standards at 0%-2.1% per year, as shown in Figure 11.

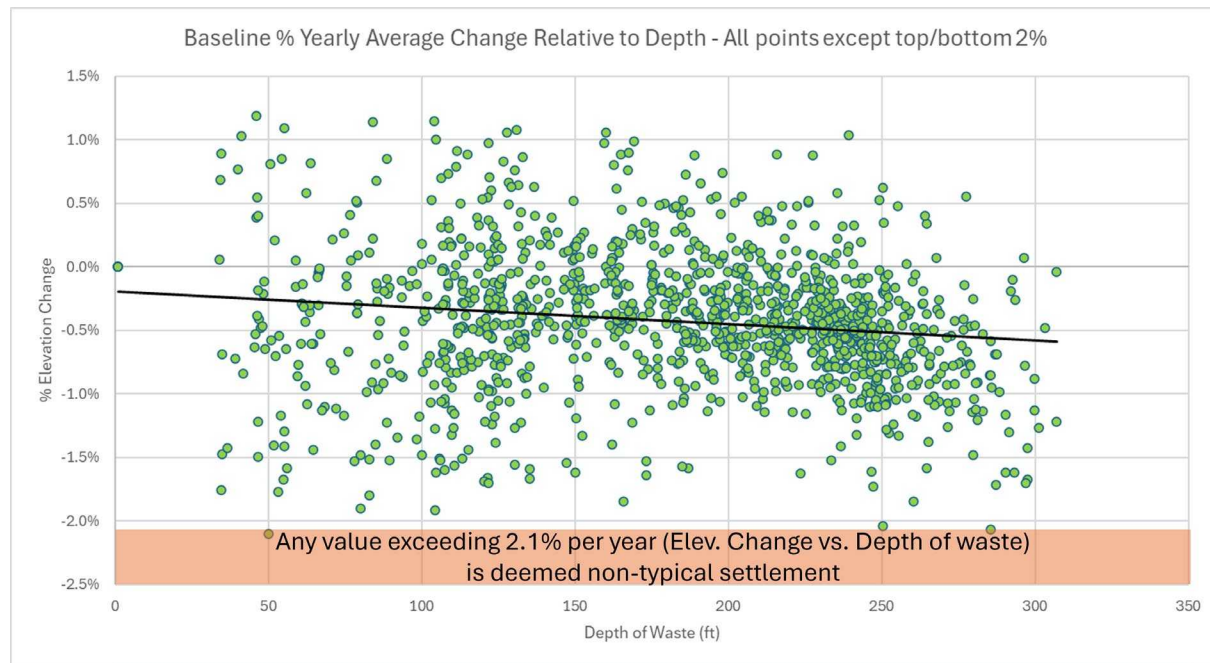


Figure 11

These baseline rates of change, which we deemed to be typical of CCL allowed us to conversely determine settlement rates that were outside the norm for CCL. We then used this data to identify annualized elevation changes in and around the RA-Data. In that regard, we determined that CCL's typical annualized settlement change was 2.1% of the waste depth, and that any settlement greater than 2.1% could be attributed directly or indirectly to the reaction. Again, please note that by convention, the landfill industry measures settlement on an annual basis. So, even though we had before and after topographic maps from intervals as frequent as weekly; by converting all data to an annualized settlement rate, we maintained the industry's standard units of measurement.

Detailed Site Settlement Analysis

With CCL's baseline settlement rate established, BRS generated new data sample points across the entire site. We selected data points based on the existing inspection grid, dividing each into quadrants, placing sample points at the center of each of those quadrants as is shown in Figure 12 with green background.

In this manner, a total of 718 points were generated across the entire Landfill footprint as shown here in Figure 13.

For the 2-year evaluation period, there were 82 individual topographic maps generated through Propeller. This equates to 81 *before and after* sample periods where elevation change occurred and 81 periods were evaluated. By taking an elevation for each of the 718 sample points from each of the surfaces, a total of 58,138 elevation change data points were obtained.

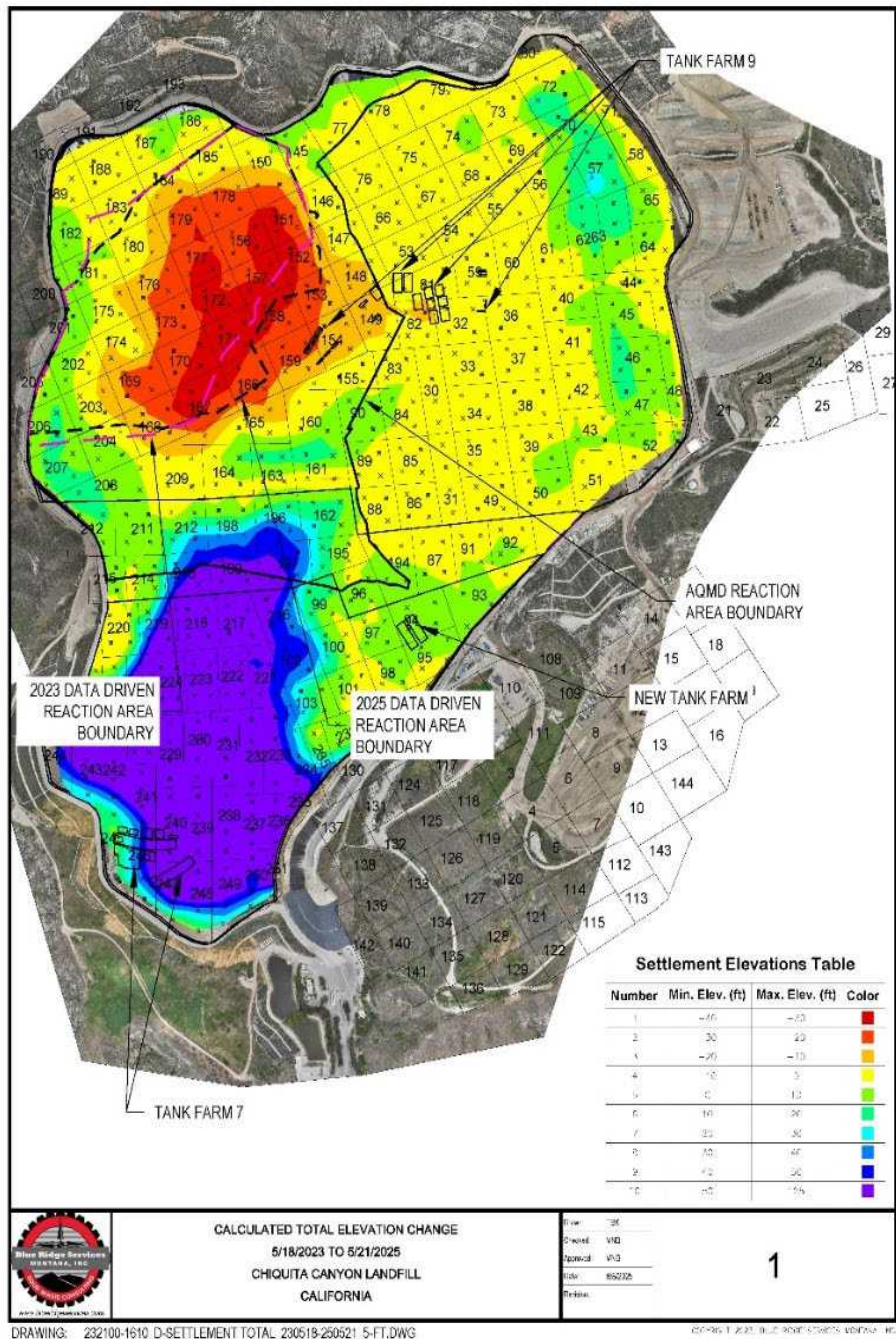


Figure 12



Surface Settlement Analysis: May 18, 2023, through May 21, 2025

The isopach shown here (See Figure 14) shows the positive and negative (fill or cut) elevation changes for all 58,138 data points for the two-year analysis period. Based on this before and after comparison, the RA-Data and its influence (e.g., depth of settlement) on adjacent areas can be clearly seen.



Total Settlement: North Half

However, because waste filling was still occurring in the southern portion of the Landfill during the analysis period (May 18, 2023, through May 21, 2025) we reduced our data set from 718 points, down to only 453 points in the north half of the Landfill. These were used with the sample area shown in Figure 15 as the green area. This resulted in a total of 37,146 points remaining for analysis.

Using data points from the north half, the first analysis was for total settlement between the start and end of the evaluation period, that being May 18, 2023, through May 21, 2025. This was done with more detailed gradation in the settlement depth color bands to identify the area of the reaction that showed the most subsidence. The purpose was to identify the potential horizontal limit of the reaction itself. Additionally, it shows the adjacent areas that were directly or indirectly impacted by the excessive settlement in the area experiencing the ETLF event.

Rate of Change

The rate of change is simply taking the percentage of elevation change relative to depth in relation to a time interval. Typically, settlement evaluations of a site are done on a yearly basis with CCL submitting monthly submissions showing the settlement for the month, expressed in feet.

In the analysis for this report, it was necessary to convert the data into a change in elevation per day because the Propeller drone mapping flights varied in frequency. Initially the mapping flights were performed monthly and then increased to twice a month. Now, these mapping flights occur weekly.

To adjust for this inconsistency in between mapping periods, we calculated the number of days in that period and then divided by the total elevation change for each point. At each point with the known elevation change per day for that period, it was then divided by the depth of waste at the start of the period in question. This elevation resulted in a percentage change in elevation per day relative to the depth of waste.



Figure 15

Surface Settlement Analysis: May 18, 2023, through May 21, 2025

As previously noted, we converted the rate of change from daily to an annualized percent rate of change to comply with the industry's standard practice of expressing landfill settlement per year. Figure 16 shows the average annual percentage settlement per year over the two-year period of the evaluation. The two-year total average clearly shows the limits of the reaction with the yearly average providing more detail on the impact of the reaction to the east. Most of the area outside of the RA-Data is experiencing a rate of change of less than 2% per year (purple and dark blue zones), which is within the baseline.

Any additional increase is likely the indirect result of the reaction through horizontal migration of heat and liquids as well as liquid removal as part of the mitigation efforts.

To help visualize any potential that the reaction was spreading, we also evaluated the rates of change on a reduced frequency.

By evaluating the percentage settlement monthly, the dynamic nature of CCL became more evident. This is particularly evident along the northeastern and eastern perimeter of the landfill (See Figure 16).

Based on review of aerial photo imagery at the time topography was generated and on review of the surfaces of selected topography the variations in the percentage settlements were due to localized grading, the adding and removing of stockpiles, placing or removing tanks, repairing settled areas, and other activities.

The effect of minor modifications to the surface elevation are much more evident along the perimeter where waste is shallow. Remember that the percentage change in settlement is based on the elevation change divided by the underlying depth of waste. Where the waste depth is shallow, the denominator becomes very small, so even minor changes in the numerator result in exaggerated percentage settlement.

Another likely contributor to these fluctuations is the massive quantities of liquids that have been, and continue to be, removed from the site through wells and the LCS. This loss of volume is likely causing

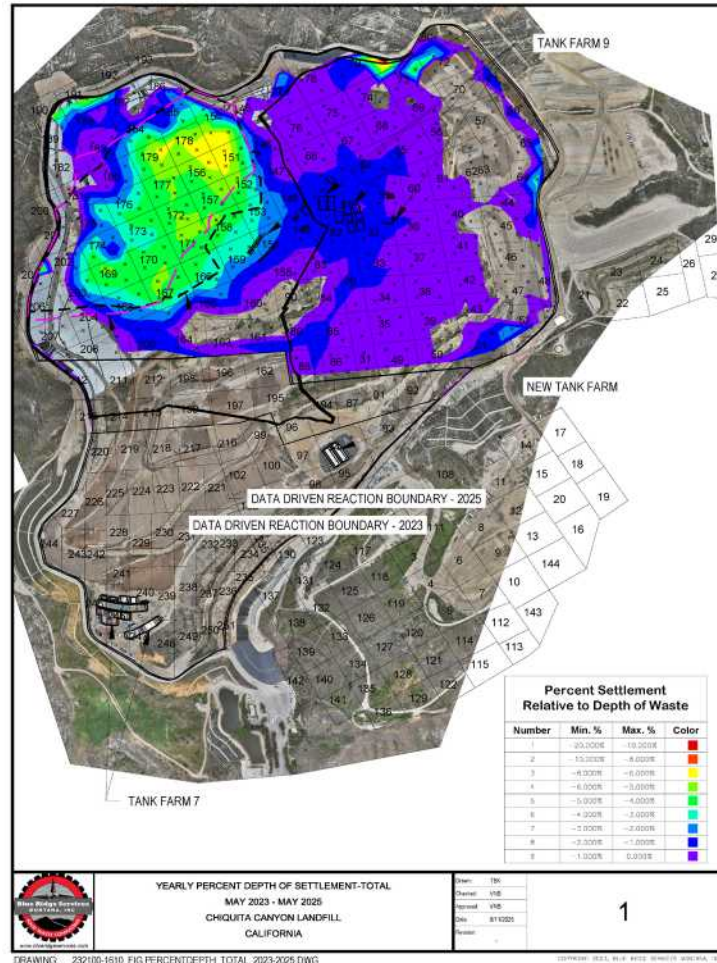


Figure 16

Surface Settlement Analysis: May 18, 2023, through May 21, 2025

some subsurface consolidation. To address these fluctuations, a Cumulative Average and a 3-Month Rolling Average were used to buffer out the extremes in the data.

Cumulative Average

The Cumulative Average is the running average of all data sets measured from the starting date to each monthly increment. As an example, the following Figure 17 shows the cumulative daily average, averaged from the start of the two-year period, for May 2023, May 2024, and May 2025. The full set of monthly comparisons can be found in Appendix A.

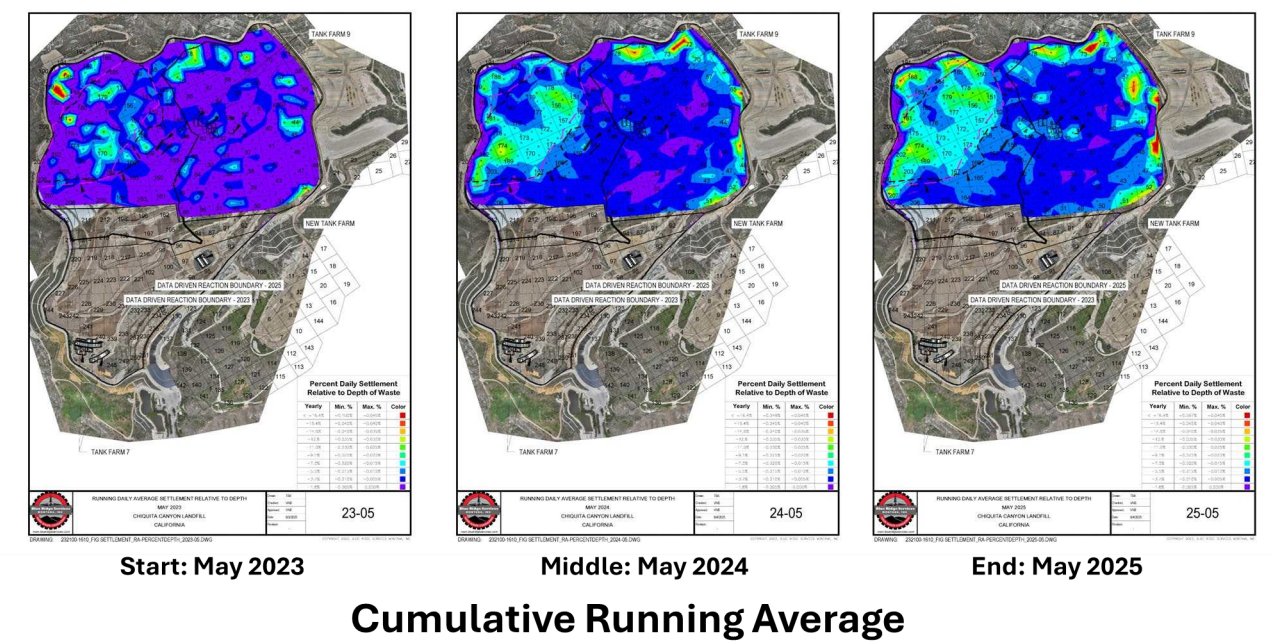


Figure 17

3-Month Rolling Average

Our last analysis was to create a 3-month rolling average of the daily percent change in elevation relative to the depth of waste. However, rather than average the rate of change from the earliest topographic map, in this analysis we simply averaged the settlement that was happening over a 3-month period, with those 3 months rolling every month. As an example, the following Figure 18 shows the rolling average for the periods of May through July 2023, April through June 2024, and March through May 2025. The full series can be found in Appendix B.

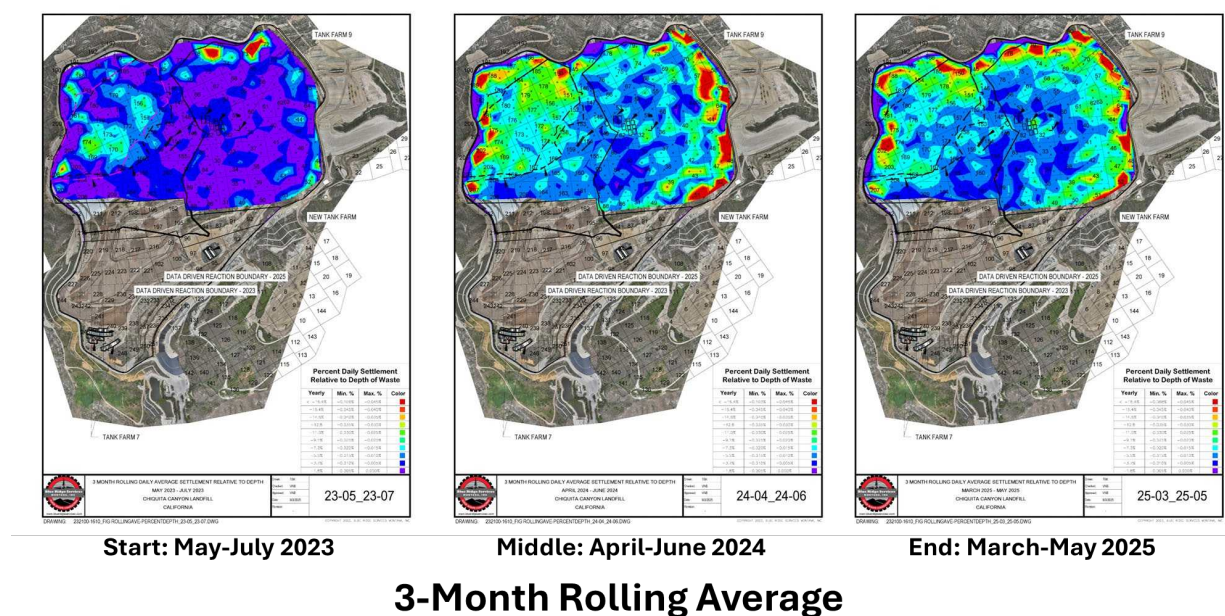


Figure 18

Based on the cumulative and 3-month rolling averages, though there are areas of increased settlement outside of the RA-Data boundary, the majority are below the rates seen within the RA-Data. When high rates of settlement are observed, they are not consistent enough to indicate that the reaction has spread to the east – or beyond the current RA-Data boundary.

CONCLUSION

Our analysis shows that the rate of change of settlement within the RA-Data is slowing. Similarly, the rate of change of settlement in areas outside – but adjacent to – the RA-Data is also slowing.

We believe those changes inside and outside the RA-Data are interrelated and are more likely the result of the indirect effects of the main subsurface reaction inside the RA-Data. The variability in rate of change of settlement in areas outside the RA-Data are the result of horizontal migration of liquids and heat causing the normal decomposition rate to increase, but not at a rate that could be associated with an ETLF event.

ATTACHMENT E



December 15, 2025

Via E-Mail

Eric Morofuji, EHS III
Los Angeles County Department of Public Health
Solid Waste Management Program
Local Enforcement Agency
Environmental Programs Division
5050 Commerce Drive,
Baldwin Park, California 91706
emorofuji@ph.lacounty.gov

Re: Chiquita Canyon, LLC Response to LEA's Comments on the Revised Draft Removal Action Workplan: Extension of Covered Area – LEA Compliance Order, May 1, 2025

Dear Mr. Morofuji:

Chiquita Canyon LLC (Chiquita) submits this response to the Local Enforcement Agency's (LEA) November 20, 2025 letter providing comments on Chiquita's revised draft Removal Action Workplan (RAW) for Extension of Covered Area, resubmitted on October 3, 2025, pursuant to section 4.1 of the LEA's Compliance Order issued on May 1, 2025, and Chiquita's response letters dated August 15, 2025 and August 18, 2025.

The revised draft RAW detailed Chiquita's plan to expand the area of the Chiquita Canyon Landfill (the Landfill) covered by 30-mil high density polyethylene (HDPE) geomembrane in accordance with the requirements of the United States Environmental Protection Agency's (EPA) Unilateral Administrative Order (UAO) issued on February 21, 2024, the South Coast Air Quality Management District's (SCAQMD) Stipulated Order for Abatement (SOFA) issued on November 13, 2024, and most recently modified on December 10, 2025, and the LEA's Compliance Order issued on June 6, 2024. This cover expansion will also supplement the area of the Landfill covered by 40-mil HDPE geomembrane in accordance with the west toe drain workplan. The revised draft RAW detailed Chiquita's process of installing additional geomembrane cover that is at least 60-mil thick, made from HDPE with an inner core of ethylene vinyl alcohol (EVOH) barrier resin, tan in color, and textured on both sides.

The LEA's November 20, 2025 letter directs Chiquita to install the approved geomembrane cover "over the entire facility where waste is disposed (Main Canyon waste management area)" by

August 31, 2026, to continue to install the approved cover during the winter months, and to provide an estimated cover installation schedule by December 15, 2025.

Chiquita disputes the LEA's rationale for requiring cover over the Main Canyon by August 31, 2026. Such an aggressive installation schedule is infeasible to safely and effectively deploy the remainder of the geomembrane cover, and covering the entire Main Canyon is an unnecessary and surprising change from the portion of the Landfill that Chiquita originally discussed covering. Pursuant to DTSC's Imminent and Substantial Endangerment Determination and Order (Order) and subsequent communications with EPA and the LEA, Chiquita had discussed covering 100 acres of the Landfill with geomembrane cover. These 100 acres do not include covering the tank farms or other areas, which Chiquita does not intend to cover now. Not only has the LEA moved the goal posts by unilaterally requiring the deployment of more geomembrane cover than previously agreed, but it has also imposed a deployment schedule that does not consider the multitude of complexities and pitfalls about which Chiquita has informed its regulators on several occasions. For the reasons described herein, in Chiquita's letters to EPA dated August 15, 2025 and to the Department of Toxic Substances Control (DTSC) dated November 7, 2025 and November 21, 2025,¹ and during our discussion with the LEA on December 10, 2025, Chiquita intends to act in a way that is most protective of the existing mitigation measures and continue to move forward with the installation of the geomembrane cover in accordance with the draft Master Schedule submitted to DTSC on November 21, 2025 and attached to this letter as **Attachment A**.²

Due to the unique and complex nature of the work needed to deploy the geomembrane cover while minimizing impacts to Chiquita's other ongoing reaction mitigation efforts and the impending rainy season, Chiquita cannot at this time commit to a further expedited and detailed schedule or to covering the entire Main Canyon. Chiquita's draft Master Schedule reflects an expeditious deployment timeline that accounts for the challenging realities, complicated logistics, and unknown variables, such as weather, that are beyond Chiquita's control and can impact the pace of such an extensive installation project.³

As the LEA is aware, under DTSC's Order and per directives from DTSC, EPA, and the LEA, Chiquita worked as expeditiously as possible to deploy the initial 15 additional acres of the geomembrane cover in Segments 1, 2, and 3 of the Landfill before the rainy season.⁴ As described in prior correspondence, during this initial deployment process, Chiquita had to take landfill gas extraction wells and dewatering pumps in the active cover deployment areas offline to complete the cover installation. To help ensure the longevity of the installed geomembrane cover, the cover must be placed on a smooth surface. This surface must also be graded for appropriate routing of stormwater. Because of ongoing settlement in the data-driven reaction area, installation of cover across this initial 15 acres included substantial subgrade preparation, requiring use of heavy equipment to complete this subgrade preparation quickly enough before the rainy season. To protect existing infrastructure from damage during this subgrade preparation phase, existing piping

¹ Chiquita expressly incorporates these letters herein.

² The draft Master Schedule is approximate and subject to change based on actual conditions at the Landfill, as further described in Chiquita's November 21, 2025 response to DTSC's comments on the draft RAW.

³ Chiquita Canyon, LLC Response to DTSC Request for Updated Cover Deployment Schedule, Nov. 7, 2025, page 2.

⁴ *Id.*

and infrastructure was removed, to the extent feasible, requiring removal of portions of the piping to enable cover installation access.⁵

As a result of taking landfill gas extraction wells and dewatering pumps offline in the active cover deployment areas, Chiquita saw an increase in on-site odors and temperatures.⁶ This complicated Chiquita's deployment strategy. Continuing to deploy the remainder of the geomembrane cover using this same approach could negatively impact the success of the mitigation measures in place to manage the reaction and mitigate odors. These impacts to the existing mitigation measures also raise questions about the practicality of installing geomembrane cover over the entire "Main Canyon waste management area," as installing just a portion of the additional coverage has disrupted the existing mitigation measures and the progress Chiquita has made to manage the reaction.

Chiquita will not compromise on ensuring that the reaction continues to be effectively managed for the sake of accelerating the geomembrane cover deployment rate. An unreasonably aggressive and strict cover deployment schedule that also requires covering unnecessary portions of the Landfill would limit Chiquita's ability to continue to evaluate the effectiveness and feasibility of its deployment strategy and to make optimizing adjustments as needed.⁷ Such an aggressive and strict schedule could hamper effective reaction management by increasing landfill gas extraction well and dewatering pump downtime, as described in Chiquita's November 7, 2025 response to DTSC, not to mention that the LEA has not explained why covering the entire Main Canyon is necessary.⁸

To continue to deploy additional geomembrane cover as quickly, safely, and effectively as possible while maintaining Chiquita's existing mitigation measures, Chiquita has begun employing a new deployment process that enables landfill gas extraction wells and dewatering pumps in active cover deployment areas to be offline for the least amount of time possible, typically one to two days at a time.⁹ As further described in prior correspondence, this new deployment process has been successful thus far, but Chiquita requires more time to fully evaluate the feasibility of this process, to optimize this process to ensure maximum operational efficiency for the remainder of the installation project, and to determine the estimated amount of time needed to complete deployment using this new process.¹⁰ Each well, lateral, header, forcemain, electrical line, and panel located in the active cover deployment area, which is constantly changing as the active cover deployment area moves, must be managed uniquely. For example, while some pieces of the system may be relatively straightforward to take offline, others may pose particular challenges due to their apparent location and the area(s) of the Landfill they service, among other factors.¹¹ In these more

⁵ *Id.*

⁶ *Id.*

⁷ *Id.* at 3.

⁸ *Id.*

⁹ *Id.* at 2.

¹⁰ *Id.* at 2-3.

¹¹ *See id.*

complicated situations, the equipment cannot be disconnected from the system, requiring piping to be lifted so that cover may be placed underneath while maintaining connection to the system.¹²

This is extremely tedious and delicate work to ensure that the equipment and infrastructure are not damaged. Even in relatively straightforward situations that allow for equipment to be taken offline, Chiquita must coordinate efforts and schedules with at least five different groups of people to disconnect the equipment in order to move the cover deployment process forward.¹³ As a point of reference, some of Chiquita's infrastructure in these areas are gas headers that are 24 inches in diameter. These headers require heavy machinery to lift, which cannot be driven directly on top of already-deployed liner, causing access issues.

Nevertheless, and despite this unavoidable reality, Chiquita's draft Master Schedule submitted to DTSC and the LEA on November 20, 2025, attempts to estimate completion dates of each phase of deployment, subject to actual conditions at the Landfill and a multitude of moving parts and competing projects, any of which could impact the installation of the geomembrane cover.¹⁴ As an example, Chiquita requested and received an extension of the original acreage deployment schedule to allow the main access road on the north side of the Landfill to remain open while other roads to the south were completed, as well as to maintain access for a drill rig to complete installation of certain temperature monitoring probes; this demonstrates the nature of the competing projects Chiquita must balance.

Deploying the geomembrane cover expeditiously is not a matter of maximizing the number of drill rigs and liner crews that can fit onsite to complete the work all at the same time; rather, it is a matter of working deliberately and meticulously to not disrupt the gas infrastructure and other existing mitigation measures, as having to perform repairs on the gas infrastructure and other existing mitigation measures themselves would require Chiquita to pause deployment. To maintain the integrity of the gas infrastructure and existing mitigation measures, Chiquita must deploy the geomembrane cover at a careful and diligent rate while still working as expeditiously as possible to avoid delays in the first place. Chiquita cannot commit to completing the installation of the geomembrane cover "over the entire facility where waste is disposed (Main Canyon waste management area)" by August 31, 2026 for the reasons described herein and in Chiquita's August 15, November 7, and November 21, 2025 responses. Chiquita instead estimates completion of additional cover by July 31, 2027, in accordance with the draft Master Schedule submitted to DTSC and the LEA on November 21, 2025.¹⁵

¹² *Id.*

¹³ *Id.*

¹⁴ For example, Chiquita recently drilled new temperature monitoring probes (TMPs) and installed thermocouples in each. These TMPs are in the same area in which the additional geomembrane cover has been or will be deployed. This necessitated pausing the cover deployment process until installation of the thermocouples in each TMP was complete. This is but one of several constantly competing projects that Chiquita must balance with the deployment of the geomembrane cover on a daily basis. Having an additional crew would not have helped because the installation of the thermocouples in the TMPs could not have been completed while the additional geomembrane cover was being deployed in the same area. *See also* Chiquita Canyon, LLC Response to DTSC Comments on Draft RAW, November 21, 2025, PDF page 33.

¹⁵ *Id.*

The LEA's letter additionally requests that Chiquita "[e]mploy the necessary resources to complete geomembrane coverage" and "[c]ontinue to install the required geomembrane cover during the winter months to ensure completion within the required timeframe, as CCL has done previously."

Since the start of the deployment of geomembrane cover, Chiquita has employed all necessary resources to work as expeditiously and safely as possible to install the geomembrane cover despite several regulatory roadblocks. As soon as DTSC ordered Chiquita on April 2, 2025 to install the geomembrane cover pursuant to DTSC's Order, Chiquita immediately began to diligently identify and source materials for the geomembrane cover and prepare a feasible construction schedule. Chiquita provided DTSC on April 22, 2025 copies of a fact sheet of the geomembrane cover material it was evaluating at that time and a case study of the geomembrane cover material's success at another landfill. Chiquita then shared its plans with DTSC to order the geomembrane cover materials once DTSC provided its written approval. Yet, such written approval did not come until June 2, 2025 due to in large part discussions between DTSC and CalRecycle relating to the color of the geomembrane cover. Given this regulatory delay, Chiquita conferred with DTSC to come up with a prioritization plan for the deployment of the geomembrane cover. Chiquita and DTSC together agreed to prioritize a 300-foot radius or approximately 15 acres of the Landfill extending from the existing 30-mil geomembrane covered area before deploying geomembrane cover over other areas of the Landfill. This plan required Chiquita to move quickly to complete the installation before the rainy season.¹⁶

From the start, and as detailed in Chiquita's previous correspondence and its monthly summary reports to DTSC, Chiquita has employed all necessary resources to deploy the geomembrane cover despite regulatory setbacks. These regulatory setbacks prevented Chiquita from moving forward with the deployment of the geomembrane cover in earnest until shortly before the start of the rainy season. Chiquita has nevertheless continued to employ all necessary resources to deploy the geomembrane cover, but this process cannot again jeopardize the Landfill's existing mitigation measures.

As described in prior correspondence, Chiquita has committed to deploying EVOH in the existing 30-mil HDPE cover area to enhance odor mitigation. Employing additional crews to deploy the geomembrane cover would not lead to a more expeditious geomembrane cover deployment rate; in fact, employing additional crews could result in occupational hazards and health and safety issues and would complicate the efficacy of the geomembrane cover deployment process and further jeopardize the other mitigation measures in place. CalRecycle's letter to the LEA, dated October 3, 2025, states, "Currently, the CCL is using only one drill rig and one liner crew; the CCL should employ the necessary resources to complete the entire waste area within the recommended timeframe." To the extent that CalRecycle or the LEA intend to insinuate that Chiquita is not making as much progress as it can due to its use of one drill rig and one liner crew, Chiquita strongly disputes this allegation. More drill rigs and liner crews do not equate to more progress.

¹⁶ Chiquita is still dealing with the repercussions of rushing to deploy the initial 15 acres of geomembrane cover before the start of the rainy season, including delays associated with deploying the final portion of geomembrane cover over Segment 3 and bringing impacted equipment back online due to the weather. See, e.g., weekly update to the LEA, Chiquita Canyon Landfill – Geosynthetic Cover – Mitigation Measure 4.1, Nov. 14, 2025; Nov. 21, 2025; Nov. 26, 2025; Dec. 5, 2025; and Dec. 12, 2025.

As described above, the work required to deploy the geomembrane cover is tedious and delicate. This is not an issue of sequencing the work like an assembly line; the pieces must fit together precisely, like a puzzle. Having more drill rigs or liner crews onsite would not expedite the deployment process, even if the liner crews were working on different jobs. To safely deploy the geomembrane cover without disrupting, or worse, breaking the existing gas infrastructure requires deliberate and meticulous work that additional hands would prevent.

Additionally, the work that must be done to deploy the geomembrane cover is highly specialized. Any crew hired to complete the work must be properly trained, as the gas infrastructure that must be moved or rerouted to accommodate deployment of the cover poses potential hazards and must be handled by crews who know how to do so safely. Finding and training knowledgeable crews is not simple, yet Chiquita has managed to add three crews to assist with the deployment of the cover in the past few months, and the contractor has brought on an additional supervisor to further assist with the deployment and train these crews.

Moreover, some portions of the Landfill have a significant amount of infrastructure that must be relocated before deployment of the geomembrane cover can occur in those areas. This infrastructure includes but is not limited to a thermal oxidizer, pump cleaning and repair equipment, and contractor trailers and offices. As the LEA is aware, Chiquita is actively working to relocate this infrastructure, but this relocation is not a simple or fast process, especially because the Landfill has limited space. Chiquita has nevertheless been diligently working to relocate this infrastructure to allow for the deployment of geomembrane cover in these areas of the Landfill.

During the winter months, also known as the rainy season, the Landfill experiences rain and other wet weather conditions that make it unsafe for personnel to access the site or operate the requisite equipment to install the geomembrane cover. Requiring Chiquita to continue deployment of the geomembrane cover regardless of weather conditions would unnecessarily endanger human health and safety and could constitute a violation of labor and occupational safety laws. Rain creates accessibility issues for heavy machinery, and to the extent that gas or liquids extraction equipment were offline, they would have to remain offline until the ground surface dried up enough to again allow machinery safe access to the area. This would further hamper Chiquita's ongoing mitigation efforts.

CalRecycle's letter to the LEA, dated October 3, 2025, states, "The CCL has previously demonstrated its ability to install a geomembrane liner during the winter months, and it should continue this approach."¹⁷ Chiquita's ability to make progress on that 30-mil geomembrane cover during the previous rainy season has no bearing on Chiquita's ability to make progress on the deployment of the new geomembrane cover this rainy season. The Landfill today is engaged in even more mitigation measures to manage the reaction than during the previous rainy season when the 30-mil geomembrane cover was installed. For instance, and as shown in Chiquita's State of the

¹⁷ The rate of previous cover deployment does not dictate present cover deployment possibilities. Chiquita previously installed approximately 45.9 acres of 30-mil cover over the course of about seven months, with completion in January 2025. It appears the LEA assumed Chiquita could continue working at the same rate and provided an August 31, 2026 deadline. However, every cover project is different and must take into account present day conditions and changes to the Landfill.

Chiquita Canyon, LLC Response to LEA Comments on Revised Draft RAW

December 15, 2025

Page 7 of 8

Landfill Report, the 30-mil deployment was initially begun in the furthest northwest corner of the Landfill, on side slopes where minimal existing infrastructure was present. The pictures in the State of the Landfill Report document progress during early 2024, which is the rainy season presumed to be referenced by CalRecycle.

As the LEA should be aware, Landfill infrastructure has changed substantially since that time. In conjunction with and upon completion of the 30-mil cover, Chiquita deployed many large gas headers to greatly expand its ability to collect and control landfill gas. As documented in the State of the Landfill Report, Chiquita added 50 miles of piping in 2024 alone, a majority of which is now in the areas being scheduled for further geomembrane deployment. Chiquita must now work around this additional infrastructure, which will slow down its ability to install further geomembrane.

Nevertheless, when the Landfill experiences a dry period long enough to allow personnel to safely access the site and operate the requisite equipment to install the geomembrane cover during the rainy season, Chiquita has been working to complete the enhancements of the existing 30-mil cover during these discrete periods. The gas infrastructure is less likely to be negatively impacted in these areas if extended pauses are needed due to the weather. Chiquita will continue to provide weekly updates on the cover installation progress to the LEA pursuant to Milestone 4.1 of the LEA's Compliance Order, including noting delays caused by the rainy season and other weather conditions.

Chiquita has detailed its geomembrane installation progress in a variety of reports, including the aforementioned weekly updates to the LEA. Chiquita also provides monthly updates to DTSC that describe in detail Chiquita's efforts since May 2025 to commence this undertaking. Consistent with our discussion with the LEA on December 10, 2025, Chiquita intends to continue to employ all necessary resources to complete the installation of the geomembrane cover by July 31, 2027, per the draft Master Schedule and subject to actual Landfill conditions.

Further deployment of the geomembrane cover to the areas that would enhance odor mitigation is of the utmost importance to Chiquita. However, the geomembrane installation process must support the continued effective management of the reaction by allowing for the unimpeded and continued extraction of heat, gas, and liquids as maximally as possible. The LEA's requested completion date of August 31, 2026 and unilateral decision that the geomembrane cover be installed over the entire Main Canyon would severely curb the progress that Chiquita has made to manage and stabilize the reaction and possibly endanger human health and safety. As such, Chiquita cannot in good conscious agree to such an infeasible request.

If you have any questions, please do not hesitate to reach out to me at (346) 807-5547 or Kate.Logan@WasteConnections.com.

Chiquita Canyon, LLC Response to LEA Comments on Revised Draft RAW

December 15, 2025

Page 8 of 8

Sincerely,

Kate Logan

Kate Logan
Senior Remediation Project Manager
Chiquita Canyon Landfill

cc: Robert Ragland, Los Angeles County Department of Public Health
Liza Frias, Los Angeles County Department of Public Health
Azar Kattan, J.D., M.P.H., Los Angeles County Department of Public Health
Ken Habaradas, Los Angeles County LEA
Karen Gork, Los Angeles County LEA
Renee Jensen, LEA Counsel
Blaine McPhillips, Senior Deputy County Counsel
Emiko Thompson, Los Angeles County Department of Public Works
Alex Garcia, Los Angeles County Department of Regional Planning
Ai-Viet Huynh, Los Angeles County Department of Regional Planning
Wes Mindermann, CalRecycle
Todd Thalhamer, CalRecycle
Rachel Beck, CalRecycle
Janelle Heinzler, CalRecycle
Jeff Lindbert, California Air Resources Board
Jack Cheng, South Coast Air Quality Management District
Larry Israel, South Coast Air Quality Management District
Enrique Casas, Los Angeles Regional Water Quality Control Board
Amy Miller, United States Environmental Protection Agency
Joel Jones, United States Environmental Protection Agency
Thanne Berg, Department of Toxic Substances Control
Peter Ruttan, Department of Toxic Substances Control
Tim Crick, Department of Toxic Substances Control
Christopher Kane, Department of Toxic Substances Control
Johnathon Crook, Department of Toxic Substances Control
Lisa Winebarger, Department of Toxic Substances Control
Bridget Floyd, Department of Toxic Substances Control
John Perkey, Chiquita Canyon
Dylan Smith, Chiquita Canyon

ATTACHMENT A

Draft Master Schedule

The Department of Toxic Substances Control's (DTSC) October 15, 2025 letter directed Chiquita Canyon, LLC (Chiquita) to submit a draft Master Schedule.¹ Chiquita provides the requested draft Master Schedule below, which is subject to change based on actual conditions at the Chiquita Canyon Landfill (the Landfill). This draft Master Schedule focuses on the scope of DTSC's Order, including the tasks scheduled for completion pursuant to the three Removal Action Workplans (RAWs) required by the Order as well as DTSC's data requests issued pursuant to section 6.11 of the Order.

Geomembrane Cover Deployment (60-mil EVOH/HDPE)

The following primary tasks are currently being executed as part of the cover deployment process; however, as deployment continues, it is possible that efficiencies will be established that may result in changes to the timing of tasks needed to complete deployment of the geomembrane.

1. Disconnect wellheads and piping
2. Relocate gas header piping
3. Prepare subgrade
4. Deploy liner
5. Construct Access Road
6. Reconnect gas header and wells
7. Install LFG boots

As previously stated in Chiquita's November 7, 2025 response to DTSC's request for an updated cover deployment schedule, which Chiquita incorporates herein, several factors will continue to impact deployment progress, including but not limited to weather conditions through the rainy season, technical challenges, and the need to coordinate with multiple contractors, personnel, and competing and concurrent projects. Until the rainy season concludes, it is difficult to accurately project how cover deployment will progress. All dates below are approximate and subject to weather conditions.

- Deployment Schedule
 - Segments 1 and 2 – Completed September 2025
 - Segment 3 (partial) – Completed November 2025
 - Segment 3 (remaining 1.7 acres) – December 12, 2025

¹ DTSC General Comment #1 ("The future submittal of the Draft RAW must include a Master Schedule of all activities planned for the landfill and a draft of the Master Schedule must be submitted to DTSC within seven (7) days for review. This Schedule shall also include timing of all responses to data requests."). Chiquita requested an extension to submit this draft Master Schedule as part of this response to DTSC's October 15, 2025 letter.

- Install 16 acres of 60-mil EVOH geomembrane over the top of the existing 30-mil geomembrane cover, which involves disconnecting and reconnecting gas headers and wells, as needed, over the geomembrane cover – March 31, 2026
- Segments 4 through 15 – November 30, 2026
- Segments 16 through 20 – July 31, 2027 (subject to weather conditions)
- Communication and Notification Schedule for Deployment Progress
 - Provide regular updates to DTSC through:
 - Weekly technical calls (Tuesdays)
 - Written weekly updates (Fridays)
 - Bi-weekly updates regarding estimated upcoming project timelines (every other Friday)

Interim Relocation and Stabilization of Containerized Waste (Tank Farm 9)

As of November 21, 2025, Tank Farm 9 has been relocated to Cell 8B. The last primary task associated with this RAW is to obtain a grading permit from Los Angeles County Public Works (Public Works).

- Permitting Schedule
 - Submitted grading permit application – August 4, 2025
 - Received comments on grading permit application from Public Works – September 25, 2025
 - Submitted notification for Conditional Authorization of hazardous waste treatment in Tank Farm 13 to the CUPA – November 20, 2025
 - Respond to Public Works’ comments on grading permit application
 - Obtain grading permit – To be determined by Public Works

Protection of Cell 8A From Intrusion of ETLF (Existing Mitigation Measures and Proposed Alternatives)

As of November 21, 2025, Chiquita has elected to consider alternatives to the requested vertical barrier in the Order. Because these alternatives have not yet been selected or finalized, Chiquita reserves the right to supplement the below schedule with additional tasks associated with the selected and finalized alternatives. The schedule below includes primary tasks associated with Chiquita’s existing mitigation measures.

- Existing Mitigation Measures Schedule
 - Gas Well Drilling
 - Landfill gas vertical extraction well drilling will continue.
 - There are 15 additional wells to be drilled in the Tank Farm 7 area that were previously inaccessible. The drilling has already started, and there are 3 wells that have yet to be drilled.

- Borehole logs are submitted to the South Coast Air Quality Management District (South Coast AQMD) in a monthly report pursuant to Condition 8 of the [Stipulated Order for Abatement in Case No. 6177-4 \(“SOFA”\)](#) (see Chiquita’s Odor Mitigation website (<https://chiquitacanyon.com/odor-mitigation/>) under Odor Maintenance Logs (“Stipulated Order Condition 8 (monthly reports)”).
- Weekly well drilling updates for the drilling of landfill gas vertical extraction wells and temperature monitoring probes are submitted to South Coast AQMD pursuant to SOFA Condition 15(c) (see Chiquita’s Odor Mitigation website under Odor Maintenance Logs (“Stipulated Order Condition 15(c) (weekly well drilling updates)”).
- Rig parts that allow for deeper drilling have been installed and the rig is now capable of drilling wells up to 195 feet in depth, subject to on-site conditions.
- Sonic Drill Rig – TMPs and SVEs
 - The sonic drill rig finished drilling TMP-36 to TMP-40 on September 24, 2025. Chiquita ordered temperature sensors and remote telemetry heads for the drilled TMPs (TMP-36 to TMP-40). The vendor was delayed in shipment. Chiquita expects to receive the equipment by November 24, 2025, and once they arrive, Chiquita expects to install them by December 5, 2025, subject to weather conditions. The thermocouples had to be ordered after drilling was completed because the Local Enforcement Agency (LEA) directed Chiquita to use an equation that depends on the final installed TMP depth to ensure equal spacing among the thermocouples.
 - The mobilization of the drill rig and widening of the existing perimeter road to allow drill rig access required more time than initially anticipated to begin the installation of soil vapor extraction (SVE) wells. The installation of SVE well SW-3S/M was completed on October 23, 2025, and SW-3D on October 27, 2025.
 - Drilling of the remaining temperature probes (TMP-22, TMP-23, and TMP-33) is being conducted concurrently to expedite the projects to the extent feasible.
 - The sonic drill rig was redirected to complete the installation of TMP-23, while the road work continued for the SVE wells.
 - As TMP-23 was being completed, Chiquita prepared the west side road for the drilling of the SVE wells.
 - Over the upcoming weeks, the sonic drill rig will move between the SVE wells and TMPs to complete both projects.
 - TMP-23 was completed on October 22, 2025, and TMP-22 was completed on October 31, 2025.

- Due to the current and expected rain conditions on-site, the west side road is currently inaccessible. We anticipate drilling will resume on December 1, 2025, after the Thanksgiving holiday.
- Chiquita and the LEA held a meeting on October 17, 2025, and determined where TMP-33 should be located. This location has been staked out and the additional work required to allow the drill rig to access this location has been completed.
- Please also see the weekly well drilling updates for the drilling of landfill gas vertical extraction wells and temperature probes submitted to South Coast AQMD pursuant to SOFA Condition 15(c) (see Chiquita's Odor Mitigation website under Odor Maintenance Logs ("Stipulated Order Condition 15(c) (weekly well drilling updates)").
- See the weekly TMP reports submitted to the LEA pursuant to [the LEA's June 6, 2024 Compliance Order](#) and to the US EPA (see Chiquita's Odor Mitigation website under Reports, Permits, and Other Documents, LEA ("Weekly submittals of all temperature monitoring probe data in accordance with Milestone 1B"))).
- Flares/TOxs
 - The HERO thermal oxidizer (TOx) is now online, and the work to relocate the Parnel TOx has been completed. All three TOx are currently running.
 - The ongoing discussion with South Coast AQMD has resulted in Chiquita modifying the permit applications for the 3 gas destruction units to be classified as flares, with verbal agreement from South Coast AQMD staff on September 24, 2025, supporting the ongoing operation of the 3 units until Flares 4 and 5 are online. Chiquita submitted an application for a permit to construct/operate and a Title V permit modification for Flare 4 to South Coast AQMD on October 30, 2023. This flare will provide additional critical destruction capacity once installed. Under the current SOFA, Chiquita would need to take down Flare 1 once Flare 4 is permitted and operational.
 - Chiquita is working through problems with the Los Angeles County Electronic Permitting & Inspections (EPIC LA) system regarding the review and approval of grading permits for Flare 4.

Data Requests (Order Section 6.11)

As of November 21, 2025, Chiquita has provided DTSC with access to data pursuant to Order section 6.11 on the following dates. Several of these documents were previously submitted to DTSC and other regulators.

- Soil compaction results for the soil placed in Cell 8B – May 7, 2025
- Follow up summary of soil compaction results – June 3, 2025

- AutoCAD files for the January 2023 topographic map and subgrade map – June 12, 2025
- Surface and base elevations for TMP-21 through TMP-35 – July 2025
- Proposed data delivery schedule pursuant to Order section 6.11 – July 21, 2025
- Raw gas data collected for the Landfill from August 20, 2024 to August 20, 2025 – August 25, 2025
- Topography of the surface of the Landfill in AutoCAD format for August 2025, ground survey points to fix the 2025 topography and properly orient the AutoCAD data, and boring logs for TMP-01 through TMP-21 and TMP-24 through TMP-35 – September 8, 2025
- EVOH Construction Quality Assurance documents – September 25, 2025
- Spreadsheet with latitudes and longitudes for a specific list of wells – October 14, 2025
- Data Management Plan – October 21, 2025 (originally submitted to US EPA and the RMAC in July 2024)
- Raw data via SCS eTools – October 30, 2025
- Raw data via RMC – November 3, 2025

ATTACHMENT F



January 12, 2026

Via E-Mail

Thanne Berg, Deputy Director
Site Mitigation and Restoration Program
Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826
Thanne.Berg@dtsc.ca.gov

Re: Chiquita Canyon, LLC Response to DTSC's December 26, 2025 Notice of Proposed Determination of Noncompliance with Imminent and Substantial Endangerment Determination and Order, In the Matter of Chiquita Canyon Landfill, Docket No. HSA-FY24/25-082

Dear Ms. Berg:

Chiquita Canyon, LLC (Chiquita) submits this response to the Department of Toxic Substances Control's (DTSC) December 26, 2025 Notice of Proposed Determination of Noncompliance with the Imminent and Substantial Endangerment Determination and Order (the Notice).¹ DTSC issued the Imminent and Substantial Endangerment Determination and Order to Chiquita on April 2, 2025 (the ISE Order).

Chiquita disagrees with each and every allegation of DTSC's Notice, including DTSC's characterization of Chiquita's draft Removal Action Workplans (RAWs) and its notice of intent to comply. DTSC claims that Chiquita has not complied with the ISE Order because it allegedly failed to submit three draft RAWs that DTSC deems adequate, pursuant to section 5.3 of the ISE Order.² Chiquita has fully cooperated with the ISE Order, including timely responding to each of DTSC's comments on the three draft RAWs and submitting revised draft RAWs. While the parties continue to review and revise the RAWs, implementation of all three draft RAWs is well underway, as described herein. DTSC also claims that Chiquita failed to provide notice of unequivocal intent to comply, pursuant to section 7 of the ISE Order.³ DTSC's claim that Chiquita failed to provide an adequate notice of intent to comply is inconsistent with facts on the ground and the law, as further described herein. For the reasons described herein, Chiquita respectfully requests that DTSC

¹ This response also addresses unfounded allegations contained in DTSC's November 18, 2025 letter to Chiquita on Task 7, Extension of Covered Area. Because DTSC subsequently rescinded its November 18, 2025 letter via a November 21, 2025 letter on the same subject, Chiquita did not respond at that time. However, despite rescinding the November 18, 2025 letter, DTSC improperly relies on allegations and statements made in that rescinded letter as a basis for its Notice. Thus, Chiquita must now respond.

² DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 1.

³ *Id.* at 2.

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 2 of 39

withdraw its Notice, and, after reviewing Chiquita's extensive communications and data productions which are described in this letter, identify with specificity any remaining perceived deficiencies with the draft RAWs. Chiquita will then endeavor to provide further revisions to the draft RAWs promptly based on a reasonable response timeframe that is commensurate with the scope of the request.

Chiquita has made consistent, good-faith efforts to communicate proactively with DTSC and to address the department's requests for revisions to the draft RAWs. However, Chiquita cannot simply agree to DTSC's requirements without first determining that they are safe, reasonable, and feasible. Chiquita will not agree to undertake action that will significantly disrupt the substantial progress it has made on mitigating the underground reaction, also known as an Elevated Temperature Landfill (ETLF) event, particularly where DTSC provides no data or evidence supporting its requirements. For example, Chiquita has been diligently expanding the new 60-mil EVOH/HDPE geomembrane cover at the direction of DTSC and other agencies. To date, Chiquita has deployed 781,783 square feet of additional geomembrane cover. Chiquita only contests the recent requirement to cover the entire main canyon of the Landfill by August 31, 2026. Despite Chiquita providing data showing how the expansion of the cover on DTSC's timeline would significantly disrupt progress on reaction mitigation and evidence showing the construction timeline is simply not possible, DTSC has failed to provide any data or evidence to the contrary.

Similarly, with respect to the vertical barrier requirement, while Chiquita remains fully committed to protecting Cell 8A, Chiquita cannot agree to measures that lack scientific support, are technically impossible, and are more likely than not to set back the substantial progress Chiquita has already made mitigating the reaction. In short, Chiquita's approach to managing the reaction is backed by science and industry expertise with a focus on data analysis rather than speculation, whereas DTSC's approach to order first and (presumably) study later is ill-advised. DTSC's proposed barrier lacks even the most basic scientific and engineering underpinnings to support its construction. Further, DTSC has not performed any cost benefit analysis that adequately grapples with the substantial negative effects of even attempting, much less completing, a project unprecedented in scope. While the regulators, including DTSC, now acknowledge that alternatives to the barrier are warranted, Chiquita has not missed any deadlines previously established by DTSC for providing such alternatives. Chiquita cannot be penalized for failing to take an action of which it had no notice. DTSC's finding of noncompliance is, therefore, unreasonable.

DTSC's Notice is not designed to protect human health and the environment. Numerous aspects of the Notice make clear that it is punitive in nature and does not advance mitigation measures or a constructive dialogue between the parties. For example, the Notice contains significant inaccuracies and mischaracterizations of Chiquita's actions, the timelines, and the communications between Chiquita and the agencies. Chiquita details these inaccuracies in its response below.

DTSC's positions are also internally contradictory. DTSC issued a separate Notice of Proposed Determination of Noncompliance on December 12, 2025, alleging that Chiquita had failed to

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 3 of 39

provide the raw data DTSC needed to evaluate the reaction and its impacts.⁴ As detailed in the December 22, 2025 response, Chiquita strongly disagrees with these assertions.⁵ Chiquita has provided unprecedented access to data, and DTSC's December 12, 2025 Notice is replete with factual inaccuracies and mischaracterizations. Chiquita provided more than 40,000 files on December 22 and 23, 2025. Before even downloading that data, DTSC issued this Notice, alleging that Chiquita has failed to take actions to contain the reaction when the department had just stated that it had inadequate information to evaluate the reaction.

With respect to the actions specified in the Notice, this is the first time DTSC has clarified several of its requirements. The ISE Order provides only high-level directions on mitigation measures, leaving the specific details to be developed in the RAWs. As described below, on several occasions, when Chiquita raised concerns or asked for clarification about DTSC's requirements, DTSC declined to engage in a constructive discussion with Chiquita about the best path forward. In fact, Chiquita has responded to the best of its ability and has provided all requested information and revisions to the draft RAWs. DTSC and Chiquita meet weekly, and Chiquita has been transparent throughout regarding its implementation plans. DTSC on the other hand, has not. Some of the positions DTSC has taken in its Notice in fact contradict other regulators' directions on the same mitigation measures. For example, while DTSC has alleged that the new tank farm's location in Cell 8B is not stable, the LEA's most recent correspondence expressed no concern with the location of the new tank farm. In addition, DTSC asserts that Chiquita failed to provide a schedule for the cover installation even though it previously directed Chiquita to follow the LEA's schedule.⁶ Moreover, while the LEA and DTSC directed Chiquita to provide alternatives regarding the barrier, DTSC's Notice suggests that Chiquita has missed deadlines of which it was not previously informed.⁷

Chiquita has repeatedly requested a clear lead from the regulators to address these exact problems. The inability of the State and local agencies to coordinate and provide clear, consistent direction to Chiquita has impeded Chiquita's progress in managing the reaction. DTSC's refusal to engage with Chiquita in good faith only exacerbates these issues and runs contrary to DTSC's mission to protect California's people, communities, and environment. Chiquita respectfully requests that DTSC withdraw its Notice, for the reasons described herein.

⁴ See DTSC Notice of Proposed Determination of Noncompliance with Imminent and Substantial Endangerment Determination and Order, Dec. 12, 2025, at 5.

⁵ See *generally* Chiquita Response to DTSC Notice of Proposed Determination of Noncompliance with Imminent and Substantial Endangerment Determination and Order, Dec. 22, 2025.

⁶ Compare DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 4-5 with DTSC Imminent and Substantial Endangerment and Order (Docket No. HAS-FY24/25-082), Task 7, Extension of Covered Area, Schedule (Site Code 302132), Nov. 21, 2025 ("In light of the Local Enforcement Agency (LEA) letter that was sent to Respondents yesterday, November 20, 2025, establishing a deadline for installation of the geomembrane cover at CCL, DTSC rescinds the November 18, 2025, letter and the requirements listed therein.")

⁷ Compare LEA Comments on the Draft Removal Action Workplan (RAW) Chiquita Canyon Landfill (CCL), SWIS No. 19-AA-0052, Nov. 20, 2025 with DTSC Imminent and Substantial Endangerment and Order (Docket No. HAS-FY24/25-082), Task 7, Extension of Covered Area, Schedule (Site Code 302132), Nov. 21, 2025 and with DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 9-12.

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 4 of 39

For ease of review, this response is organized as follows:

- I. DTSC's ISE Order improperly conflicts with requirements of other agencies.
- II. Chiquita has acted diligently and in good faith to comply with the ISE Order.
- III. Chiquita timely provided an appropriate Notice of Intent to Comply.
- IV. Chiquita's draft RAWs met the requirements set forth in the ISE Order.
 - a. Chiquita submitted a satisfactory draft cover RAW.
 - i. Chiquita provided an implementation schedule that was as detailed as possible in satisfaction of section 5.3(n) of the ISE Order.
 - ii. Chiquita included all relevant criteria, plans, and specifications in satisfaction of section 5.3(c) of the ISE Order.
 - iii. Chiquita adequately identified the goals to be achieved in satisfaction of section 5.3(b) of the ISE Order.
 - iv. Chiquita provided a site description that includes current site conditions in satisfaction of section 5.3(a) of the ISE Order.
 - v. Chiquita included an adequate description of cover installation methods in satisfaction of section 5.3(e) of the ISE Order.
 - b. Chiquita submitted a satisfactory relocation RAW.
 - i. The relocation of Tank Farm 9 to Cell 8B satisfies section 5.1.2(b) of the ISE Order because Cell 8B was the only available option for the prompt relocation of Tank Farm 9, it was the most environmentally protective location, and it is currently stable.
 - A. The history of Tank Farm 9.
 - B. Planning, designing, siting, and constructing the new tank farm.
 - C. Cell 8B is the most environmentally protective location at the Landfill that allowed for the prompt relocation of Tank Farm 9.
 - D. Cell 8B is currently stable and is expected to remain stable for the foreseeable future.
 - E. Relocating Tank Farm 9 to Cell 8B satisfies section 5.1.2(b) of the ISE Order.

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 5 of 39

- ii. Chiquita has provided all relevant criteria, plans, and specifications in satisfaction of section 5.3(c) of the ISE Order.
 - iii. Chiquita addressed DTSC's comments regarding the relocation RAW.
- c. Chiquita is dedicated to protecting Cell 8A and complying with all section 5.1.2(c) obligations that do not harm mitigation efforts.
 - i. Cell 8A is not in imminent and substantial danger.
 - ii. DTSC's requested vertical barrier is not supported by scientific analysis, is technically infeasible, and would negatively impact Chiquita's successful mitigation measures.
 - A. DTSC's requested barrier is not supported by scientific evidence and contradicts LEA's most recent directive.
 - B. DTSC's requested barrier is neither technically nor practically feasible.
 - C. DTSC's requested barrier would negatively impact Chiquita's existing, successful mitigation measures.
 - iii. The draft barrier RAW and other correspondence provide sufficient support for Chiquita's approach to manage the reaction.
 - iv. The draft barrier RAW satisfied all other requirements under the ISE Order.

I. DTSC's ISE Order improperly conflicts with requirements of other agencies.

The DTSC's ISE Order and Notice conflict with the Unilateral Administrative Order issued by the United States Environmental Protection Agency (EPA) on February 21, 2024 (UAO) and the Compliance Order issued by Los Angeles County Department of Public Health, acting as the Local Enforcement Agency (LEA), on May 1, 2025 (2025 LEA Compliance Order).⁸ Several DTSC communications to Chiquita have also conflicted with EPA and LEA demands, requiring Chiquita to reconcile those differences without sufficient guidance from DTSC. Chiquita explains the duplicative and contradictory nature of these state and federal orders in more detail in its Request for a Formal Appeal Hearing and Petition for Stay of the 2025 LEA Compliance Order.⁹ Chiquita

⁸ U.S. EPA, Unilateral Administrative Order, EPA Docket No. RCRA 7003-09-2024-0001 and CERCLA 106-09-2024-05 (Feb. 21, 2024), available at <https://s3.us-west-1.amazonaws.com/chiquitacanyon.com.bucket/2024/04/rcra-7003-09-2024-0001-cercla-106-09-2024-05-chiquita-canyon-llc-uao-2024-02-21-1.pdf>; Los Angeles County Department of Public Health, acting as the Local Enforcement Agency, Compliance Order (May 1, 2025), available at <https://s3.us-west-1.amazonaws.com/chiquitacanyon.com.bucket/2025%2F05%2F2025-05-01-LEA-Compliance-Order-Chiquita-Canyon-Landfill-5.1.2025-Final.pdf>.

⁹ See Chiquita's Request for a Formal Appeal Hearing and Petition for Stay of LEA's May 1, 2025 Compliance Order (May 16, 2025), provided in Attachment A.

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 6 of 39

is not in violation of the ISE Order because it had good cause for not following DTSC's demands that are in conflict with or duplicative of the requirements in the EPA UAO and are thus preempted by the EPA UAO.

Under the Supremacy Clause, state and local laws and orders that “interfere with, or are contrary to the laws of Congress” are preempted and are therefore invalid.¹⁰ Thus, conflict preemption exists wherever the ISE Order or DTSC's demands under the ISE Order are in opposition to the pre-existing federal UAO.¹¹ Chiquita does not dispute that DTSC may exercise authority at the Landfill. Chiquita does object, however, that Chiquita must or even could follow the orders of DTSC that conflict with those of the federal EPA.

Section 5.1.2 of the ISE Order and its three subsections conflict with the “Master Work Plan” requirement of Paragraph 22 in the EPA-issued UAO.¹² UAO Paragraph 22 required Chiquita to develop (1) a “Leachate Management Plan” which controls the operating procedures to accumulate and manage leachate at the Landfill; (2) a “Soil Reaction Break/Barrier Plan” which includes the installation of waste temperature monitoring devices and specifications of a containment trench; and (3) a “Cover Installation Plan” which requires the installation of a High-Density Polyethylene geomembrane. The Master Work Plan, including these individual workplans, are all subject to EPA oversight and approval: “Following EPA's approval or modification of the Master Work Plan, [Chiquita] shall implement the Master Work Plan in accordance with the schedule and provisions approved by EPA.”¹³ The requirements of section 5.1.2 of the ISE Order overlap and conflict with the requirements of Paragraph 22 of the UAO. DTSC and EPA having approval authority over the same actions is in conflict and interferes with EPA's federal authority.¹⁴ This conflict also creates a confusing regulatory environment prone to inefficiencies, miscommunications, and frustrations for all parties involved. Chiquita cannot be in violation of an ISE Order that is preempted by the EPA UAO; penalizing Chiquita for noncompliance with conflicting and preempted requirements would violate due process.

Section 5.1.2 of the ISE Order also directly overlaps and conflicts with sections 4.1, 4.2, and 4.3 of the LEA's 2025 Compliance Order, which also requires Chiquita to extend the geomembrane cover, relocate Tank Farm 9, and install a barrier to prevent expansion of the reaction to Cell 8A.¹⁵

¹⁰ *Fireman's Fund Ins. Co. v. City of Lodi, California*, 302 F.3d 928, 943 (9th Cir. 2002).

¹¹ See e.g., *U.S. v. City and County of Denver, Colo.*, 916 F. Supp. 1058 (D. Colo. 1996) (holding that the City's cease and desist order violated the supremacy clause by being in direct conflict with an EPA order).

¹² See U.S. Environmental Protection Agency, Unilateral Administrative Order, EPA Docket No. RCRA 7003-09-2024-0001 and CERCLA 106-09-2024-05 (Feb. 21, 2024).

¹³ *Id.* at 26. EPA itself has noted that its UAO preempts the actions of state agencies. Although EPA has indicated it is abating “until further notice” the UAO requirements related to the Soil Reaction Break/Barrier Plan, EPA has reiterated it “reserves all rights under Section XXIV of the UAO, CERCLA, or other authorities to require CCL to take measures to address the potential expansion of the reaction, including a soil break/barrier, in the future, thus confirming its preemptive role over the state agencies.” Letter from EPA to Chiquita re Second Revised Soil Reaction Break/Barrier Plan, dated Apr. 16, 2025, provided in Attachment B. Chiquita therefore objects to section 5.1.2 of the ISE Order as it is preempted by the UAO. See *Fireman's Fund Ins. Co.*, 302 F.3d at 943.

¹⁴ See Chiquita's Request for a Formal Appeal Hearing and Petition for Stay of LEA's May 1, 2025 Compliance Order (May 16, 2025), at 3.

¹⁵ See Los Angeles County Department of Public Health, acting as the Local Enforcement Agency, Compliance Order (May 1, 2025).

The 2025 LEA Compliance Order also requires that the LEA approve Chiquita's relevant workplans. Having multiple regulators with independent review and approval authority over the same substantive work has created an impossible compliance situation. Specific examples of conflict are described below in more detail, including direct conflicts between the LEA and DTSC's directions with respect to the cover expansion, the tank farm relocation, and the barrier plan. The dueling and overlapping orders are particularly egregious when the workplans demand strict, often competing, timelines for compliance despite the high potential for delay due to forces outside of Chiquita's control, such as engineering challenges in an evolving landfill environment, supply chain irregularities, and exceptionally heavy precipitation. Chiquita has raised these concerns with DTSC on several occasions, only to have its concerns ignored or met with accusations of noncompliance. Compliance with both the 2025 LEA Compliance Order and the DTSC ISE Order is not feasible; penalizing Chiquita for noncompliance with overlapping and conflicting orders and inconsistent regulator positions would be unfair and violate due process.

II. Chiquita has acted diligently and in good faith to comply with the ISE Order.

Chiquita continues to devote substantial time and resources to respond to the reaction with unprecedented scope and rigor, including developing and implementing robust RAWs.¹⁶ Despite operating in one of the most challenging regulatory environments in the United States, involving multiple agencies and significant regulator turnover, Chiquita has remained diligent in its compliance and response efforts.¹⁷

As DTSC is aware through the department's and Chiquita's interactions during the standing weekly technical meetings, Chiquita is engaged in implementing wide-spread mitigation measures that are individually difficult and further complicated by their interconnectedness to other ongoing measures. Chiquita is responding to an unprecedented event with unique and tailored solutions and applications that must be considered and implemented holistically. Customized solutions rarely come out of a box ready to go without challenges or the need for refinement. In fact, it is a testament to Chiquita's ongoing commitment to manage the reaction that it continues to evolve and improve its management strategies to best respond to issues and challenges as they arise.

Considering this unique event and Chiquita's extensive compliance efforts and response to the reaction, Chiquita is struggling to reconcile DTSC's shift in its tone over the past several weeks, including in this Notice, with the on-the-ground reality. Contrary to DTSC's assertions, Chiquita has responded to the reaction with the gravity it deserves.¹⁸ Chiquita has spent tens of millions of

¹⁶ *Contra* DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 1.

¹⁷ *See, e.g.*, 34th Annual Environmental Law Conference at Yosemite, Session 6.3 – Chiquita Canyon Landfill – When the Environmental Externalities of Municipal Waste Heat Up; *see also, e.g.*, email from D. Barclay to K. Logan, CCL: Request to Delay Deployment of Final Portion of Segment 3 of Geomembrane Cover (Docket No. HSA-FY24/25-082), Oct. 31, 2025 (“I will be the main point of contact for CCL moving forward and Dan Ziarkowski is retiring effective Monday. Please address your communications to me with ccs to Christopher Kane, Tim Crick, Pete Ruttan, and Bridget Floyd.”)

¹⁸ *Contra* DTSC Imminent and Substantial Endangerment Determination and Order (Docket No. HAS-FY24/25-082, Task 7, Extension of Covered Area, Schedule, Nov. 18, 2025 (“[B]y rejecting the urgency that is due this emergency situation, [Chiquita is] making several people in the California government very nervous, leading some to look into enforcement options. I am requesting that [Chiquita] treat this situation with the gravity that it deserves.”).

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 8 of 39

dollars to mitigate the reaction, and its experts have repeatedly confirmed that its actions are working to slow and stabilize the reaction. Since DTSC issued the ISE Order to Chiquita on April 2, 2025, Chiquita has installed approximately 17.9 acres of 60-mil EVOH/HDPE geomembrane cover in and around the reaction area; installed 80 vertical landfill gas extraction wells, for a total of 365 operational wells, to collect landfill gas and leachate; installed and replaced additional dewatering pumps in vertical landfill gas extraction wells, for a total of 149 pumps, to extract leachate; and installed eight in-situ waste temperature monitoring probes, for a total of 40 probes, in and around the reaction area at varying depths.¹⁹ As directed in various other compliance orders, Chiquita has installed a new permanent landfill gas combustion flare, for a total of three flares, with plans to install a fourth flare; three portable thermal oxidizers to combust and remove landfill gas from the reaction area; three new groundwater monitoring wells, two onsite and one offsite; a perimeter odor control misting system and 1,000 feet of semi-permanent vapor odor control in the reaction area to reduce potential odors; and ten micro gas chromatograph (microGC) air monitoring units to monitor air constituents 24 hours a day, seven days a week, among several other mitigation measures. Beginning January 2024 through the end of December 2025, Chiquita extracted an estimated 163,960,668 gallons of leachate.²⁰ Chiquita has also increased landfill gas collection to 16,700 cubic feet per minute; during December 2025, the overall gas extraction from the Landfill was approximately 701,249,760 cubic feet. In summation, Chiquita remains wholly dedicated to containing the reaction and restoring the Landfill to typical conditions.

Chiquita's actions and responses to DTSC have also been timely. To the extent the regulators allege delay, they should consider in fact their own role in that timeline. Figure 1 below shows that DTSC has taken demonstrably longer to respond to Chiquita's submittals than Chiquita takes to provide such submissions. Because of the time in which it takes the regulators to consider Chiquita's workplans and proposals, Chiquita must implement measures before approval. If Chiquita did not act quickly to implement necessary measures, its regulators would surely accuse it of delay and bad faith (as DTSC is doing now). But by acting to implement orders before approval, Chiquita

¹⁹ Chiquita is currently operating 37 temperature monitoring probes at the Landfill. Chiquita has completed its drilling of three additional probes which are not yet operational. Chiquita expects to begin operating these three remaining probes by February 6, 2026, after it has received and installed the temperature sensors and telemetry heads necessary for the probes, as explained in its weekly reports submitted to DTSC, EPA, and the LEA.

²⁰ Chiquita is providing this information to the best of its knowledge; this information is subject to change based on further review and verification.

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 9 of 39

risks added time and expense of redoing work.

Figure 1: Timeline of Chiquita's and DTSC's Response Times for ISE Order Tasks

Event	Task 1 – Extension of Cover RAW	Task 2 – Relocation of Tank Farm 9 RAW	Task 3 – Protection of Cell 8A RAW
ISE Order issued to Chiquita	April 2, 2025	April 2, 2025	April 2, 2025
Days between issuance of the ISE Order and Chiquita's submittal	44 days	37 days	90 days
Days between Chiquita's submittal and DTSC's first set of comments	80 days	81 days	106 days
Days between DTSC's response and Chiquita's submittal	60 days	52 days	23 days
Days since submittal without receiving a response	101 days	115 days	52 days
Total time RAW with Chiquita	104 days	89 days	113 days
Total time RAW with DTSC	181 days	196 days	158 days

Chiquita has moved as swiftly as possible to comply with the ISE Order, communicate issues and concerns, and keep DTSC apprised of its progress. DTSC has not reciprocated with the same swift or cooperative spirit. Although Chiquita and DTSC disagree on the appropriate response actions to manage the reaction, DTSC's accusations that Chiquita does not understand the gravity of the situation, and that Chiquita personnel regard complying with the ISE Order as a wasteful drafting exercise, are inaccurate, unhelpful and unwarranted.²¹ Moreover, such accusations are not technical or otherwise constructive to the overall goal of the ISE Order. These accusations, together with the explicit threat of enforcement, are difficult to view as anything other than political and are plainly inappropriate given that, over the past 24 months, Chiquita has spent tens of millions of dollars on mitigation measures and direct community payments. Customized solutions specific to the Landfill cannot reasonably or reliably be forecasted years in advance, particularly in a hostile regulatory environment. Chiquita therefore respectfully requests that DTSC withdraw its Notice, and, after reviewing the referenced communications and data productions, identify with specificity any remaining perceived deficiencies with the draft RAWs and confer with Chiquita to align on

²¹ See DTSC Imminent and Substantial Endangerment Determination and Order (Docket No. HAS-FY24/25-082, Task 7, Extension of Covered Area, Schedule, Nov. 18, 2025 (“B”) rejecting the urgency that is due this emergency situation, [Chiquita is] making several people in the California government very nervous, leading some to look into enforcement options. I am requesting that [Chiquita] treat this situation with the gravity that it deserves. . . . I realize that some working on the CCL project see scheduling updates as simply a wasteful drafting exercise . . .”).

these issues.

III. Chiquita timely provided an appropriate Notice of Intent to Comply.

Section 7 of the ISE Order required Chiquita to provide written notice stating whether it would comply with the terms of the ISE Order or provide any “sufficient cause” defenses under Health and Safety Code sections 78870 and 79055(a)(1)(B) or Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) section 107(c)(3). More than nine months later, DTSC now claims that Chiquita’s response was equivocal and did not meet the strictures of section 7 in regard to protecting Cell 8A.²² Not so. Chiquita’s response was clear.

In its April 9, 2025 response, Chiquita stated its belief that it was already in compliance with providing necessary measures to protect Cell 8A.²³ In a meeting between DTSC’s and Chiquita’s technical personnel on the previous day (April 8, 2025), DTSC told Chiquita that its previously designed and implemented soil barrier may be adequate. At DTSC’s request, on May 13, 2025, Chiquita submitted to DTSC a Construction Quality Assurance report regarding the previously constructed soil barrier for DTSC’s evaluation.²⁴

Chiquita also unequivocally stated in its April 9, 2025 response that it would not construct a barrier consistent with DTSC’s design and presented sufficient cause defenses as to why.²⁵ The Health and Safety Code provides that only parties who fail to abide by an order “without sufficient cause” are subject to penalties.²⁶ DTSC’s requested design, shown below in Figure 1, would require “excavating a vertical shaft using a three or four-foot auger drill rig,” backfilling the shaft “with a soil-bentonite or soil-cement mix,” and installing “tangent” shafts and rows of vertical shafts.²⁷ As previously explained to DTSC and reiterated below, the barrier requested by DTSC is not only without scientific underpinnings but would be physically impossible to construct. In short, DTSC’s

²² DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 2.

²³ Chiquita’s Sufficient Cause Defenses and Notice of Intent to Comply, April 9, 2025, at 6-7.

²⁴ Email from K. Logan to P. Ruttan (DTSC), et al., CCL: Construction Quality Assurance Report for the Soil Barrier Construction Project (Docket No. HSA-FY24/25-082), May 13, 2025 (attaching report).

²⁵ Parties have “sufficient cause” if they have a reasonable belief that they are not liable under the statutes or can show that the applicable provisions or guidance give rise to an objectively reasonable, good faith belief in the invalidity or inapplicability of the Order. *See Solid State Circuits, Inc. v. EPA*, 812 F.2d 383, 390 (8th Cir. 1987); *see also Pakootas v. Teck Cominco Metals, Ltd.*, 452 F.3d 1066, n.13 (9th Cir. 2006).

²⁶ Cal. Health & Safety Code §§ 79550, 79570. *See also Foster-Gardner, Inc. v. Nat’l Union Fire Ins. Co.*, 18 Cal. 4th 857, 867, 959 P.2d 265, 272 (1998), *as modified* (Sept. 23, 1998) (“[A] PRP that fails to comply with an Order *without sufficient cause* is subject to a civil penalty” (emphasis added)); *Cnty. of Santa Clara v. U.S. Fid. & Guar. Co.*, 868 F. Supp. 274, 278 (N.D. Cal. 1994) (“A potentially responsible party may decline to follow an RAO if there is sufficient cause to believe that it is not liable for the remediation.”); *Wagner Elec. Corp. v. Thomas*, 612 F. Supp. 736, 745 (D. Kan. 1985) (construing CERCLA § 107(c)(3) as prohibiting “assessing punitive damages against a party who fails to comply with an EPA order in the reasonable belief that it has a valid defense to that order”); *Aminoil, Inc. v. United States*, 646 F. Supp. 294, 299 (C.D. Cal. 1986) (punitive damages permissible under CERCLA only when party refused to comply with order in bad faith).

²⁷ ISE Order, Ex. 6 (Memo from T. Stark to ERRC, Inc., Comments on November 26, 2024 Revised Soil Reaction Break/Barrier Plan and February 20, 2025 Waste Temperature Data for Chiquita Canyon Landfill Subsurface Elevated Temperature (SET) Event, Feb. 26, 2025) (Stark Memo)), at 13-14.

requested barrier was and is arbitrary, capricious, not supported by substantial evidence, and otherwise not in accordance with law, and would be harmful to the community.

Figure 1– DTSC Requested Barrier Design²⁸

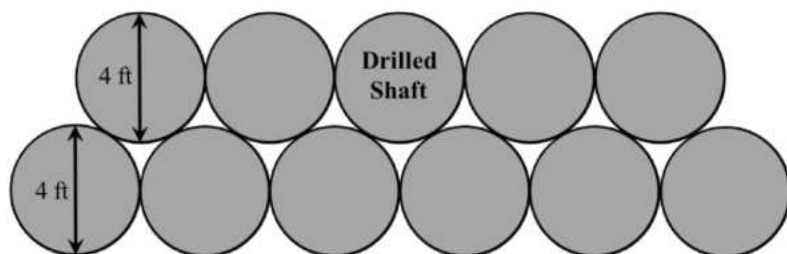


Figure 8. Possible configurations of 3 to 4 ft diameter vertical elements to comprise a heat barrier system south of TP06 to isolate southernmost 13 acres.

DTSC’s new claim in its December 26, 2025 correspondence that Chiquita “made no attempt to unequivocally commit to the broader goal of protecting Cell 8A” is blatantly false.²⁹ To reiterate, Chiquita remains fully committed to protecting Cell 8A. Chiquita continues to implement all scientifically recognized measures to prevent the expansion of the reaction into Cell 8A, as described above.

Further, the evidence shows that Chiquita’s mitigation actions to protect Cell 8A have been successful. Nine months after DTSC issued its ISE Order, Cell 8A remains fully protected. There is no indication that the reaction has expanded into Cell 8A or will do so imminently.³⁰ There is no indication that any slope stability problems exist or will develop imminently, as evidenced by the multiple slope stability analyses submitted to DTSC.³¹ Instead, reaction conditions remain stable, in a general equilibrium, and in some places are cooling.³² DTSC claimed nine months ago that an

²⁸ Stark Memo, at 14.

²⁹ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 2.

³⁰ See the most recent Monthly Reaction Committee Determination on Reaction Area Boundary, submitted on January 9, 2026, for the month of December 2025, in accordance with Condition Nos. 9a and 9b of the Stipulated Order for Abatement (SOFA) issued by the South Coast Air Quality Management District (Case No. 6177-4). This report will be available on Chiquita’s website on January 16, 2026.

³¹ See Comprehensive Global Stability Study Work Plan, Chiquita Canyon Landfill, Castaic, California, Dec. 17, 2025; Chiquita Canyon Landfill - Proposed Hazardous Waste Tank System Global Static and Seismic Stability Analysis, prepared by SCS Engineers, Nov. 27, 2025; Professional Engineer Hazardous Waste Tank System Assessment & Certification, prepared by SCS Engineers, Nov. 19, 2025; Master Development Plan Stability Analyses, Project No. RM22.1077.00, prepared by Geo-Logic Associates, Aug. 23, 2024; West and North Slope Stability Analyses, Project No. RM23.1077.00, prepared by Geo-Logic Associates, Feb. 2024; Slope Stability Analysis Work Plan, prepared by Geo-Logic Associates, Dec. 14, 2023.

³² The most recent Monthly Reaction Committee determination concluded that “ETLF conditions are fully contained within the Reaction Area boundary, and have not expanded into a new cell.” See Monthly Reaction Committee Determination on Reaction Area Boundary, Chiquita Canyon Landfill, dated Jan 9, 2026. In some instances, temperatures have decreased since April 2025. For example, TP-04’s and TP-20’s average temperatures at every depth were lower in November 2025 than in April 2025. Chiquita’s April 2025 Monthly Report, available at <https://s3.us-west-1.amazonaws.com/chiquitacanyon.com.bucket/2025/05/2025-05-09-Reaction-Committee-Determination-on-Reaction-Area-Final.pdf>; Chiquita’s November 2025 Monthly Report, available at <https://s3.us-west-1.amazonaws.com/chiquitacanyon.com.bucket/2025/11/2025-11-09-Reaction-Committee-Determination-on-Reaction-Area-Final.pdf>.

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 12 of 39

“imminent” and “substantial” danger exists at the Landfill. The facts and the significant progress that continues to be made at the Landfill prove otherwise.

With respect to the DTSC requirements relating to the geomembrane cover and the relocation of the tank farm, Chiquita expressed in its intent to comply with the broad goals set forth in the DTSC ISE Order. As described further below, DTSC’s current allegations of noncompliance arise from implementation details that were not set forth in the DTSC ISE Order, but have been ordered by subsequent correspondence, including, in some instances, for the first time in the Notice. For clarity, and to the extent necessary to preserve any appellate rights, Chiquita’s response should be construed as providing sufficient cause defenses with respect to DTSC’s implementation and interpretation of these provisions of the ISE Order.

DTSC’s claim that Chiquita failed to provide an adequate notice of intent to comply is inconsistent with facts on the ground and the law.³³ Chiquita therefore respectfully requests that DTSC withdraw its Notice, including its claims that Chiquita failed to satisfy the requirements of section 7 of the ISE Order.

IV. Chiquita’s draft RAWs met the requirements set forth in the ISE Order.

Chiquita disputes DTSC’s assertion that it failed to submit draft RAWs that met the requirements of section 5.3 of the ISE Order.³⁴ Chiquita addressed all of section 5.3’s requirements in its draft RAWs, including the requirements provided in subsections (a), (b), (c), (e), (f), (n), and (o).³⁵ To the extent that DTSC believes that Chiquita did not satisfactorily address these requirements in some or all of the draft RAWs, DTSC should have provided further direction and comment in order for Chiquita to collaboratively revise the draft RAWs to meet DTSC’s expectations rather than raise these issues at first blush in a notice of proposed determination of noncompliance.

The ISE Order is devoid of guidance or expectation on section 5.3’s requirements. Taking subsection (b) as an example, DTSC directed the draft RAWs to include “[t]he goals to be achieved by the removal actions identified in 5.1.2 of this Order[.]”³⁶ Chiquita provided in each draft RAW a description of the “goals and objectives” to be achieved.³⁷ DTSC nevertheless alleges that

west-1.amazonaws.com/chiquitacanyon.com.bucket/2025/12/2025-12-10-Reaction-Committee-Determination-on-Reaction-Area_Final.pdf.

³³ See, e.g., *Meghrig v. KFC W., Inc.*, 516 U.S. 479, 485-86 (1996) (citation omitted) (“An endangerment can only be ‘imminent’ if it ‘threaten[s] to occur immediately.’”); *Santa Clarita Valley Water Agency v. Whittaker Corp.*, 99 F.4th 458, 476 (9th Cir. 2024) (no imminent or substantial danger where “there is no ‘necessity for . . . action’ in excess of the actions already taken and those that are currently ongoing,” including “remedial actions” and the installation of “over two hundred monitoring wells”) (quoting *Price v. U.S. Navy*, 39 F.3d 1011, 1019 (9th Cir. 1994)).

³⁴ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 2.

³⁵ *Contra* DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 2-3.

³⁶ ISE Order § 5.3(b).

³⁷ See, e.g., Revised Draft Removal Action Workplan, Extension of Covered Area, Oct. 3, 2025, section 2.3 (“This section addresses Section 5.3(a) of the ISE Order. The goal/objective of this removal action is to extend the area of the Landfill provided with a geomembrane cover. The primary purpose of the extension is to improve LFG collection and thereby minimize emissions and reduce odors. In addition, the geomembrane reduces infiltration into the landfill waste.”); Revised Draft Removal Action Workplan, Interim Relocation and Stabilization of Containerized Waste, Sep. 19, 2025, section 2.3 (“The primary goal/objective of this removal action is to relocate Tank Farm 9 on an interim

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 13 of 39

Chiquita's draft cover RAW, for example, did not meet this requirement because it "does not reference the SET event/landfill reaction in the Goals and Objectives section."³⁸ The draft cover RAW references the reaction in multiple sections.³⁹ The ISE Order does not state that Chiquita's draft RAWs must reference the "SET event/landfill reaction" to satisfy section 5.3(b). Neither did DTSC's comments on the draft cover RAW dated August 4, 2025.⁴⁰

Chiquita respectfully requests that DTSC withdraw its Notice, including its claims that Chiquita failed to submit draft RAWs that met the requirements of section 5.3 of the ISE Order. Chiquita should not learn about DTSC's expectations for the draft RAWs for the first time in a Notice of Proposed Determination of Noncompliance. Absent clearer requirements in the ISE Order, these expectations could and should have been communicated earlier to Chiquita during any of Chiquita's and DTSC's weekly meetings, in email correspondence, or during other methods of communication. Chiquita has consistently demonstrated a willingness to communicate and cooperate, but DTSC must first explicitly state its expectations to give Chiquita the opportunity to address them. Chiquita cannot reasonably infer such expectations when they are omitted from DTSC's communications and correspondence, especially when those expectations seem to evolve as further development of the draft RAWs occurs. Chiquita requests that after reviewing Chiquita's extensive communications and data productions described in this letter, DTSC identify with specificity any remaining perceived deficiencies with the draft RAWs. Chiquita will then endeavor to provide further revisions to the draft RAWs promptly based on a reasonable response timeframe that is commensurate with the scope of the request.

a. Chiquita submitted a satisfactory draft cover RAW.

Chiquita's draft cover RAW satisfied the requirements of the ISE Order and adequately responded to DTSC's comments.⁴¹ Many of DTSC's allegations regarding this RAW ignore the site visits, weekly conversations, and consistent correspondence between the department and Chiquita regarding the deployment of the geomembrane cover, including the extent of the work that has been completed thus far, detailed installation methods designed to optimize installation, and issues with the deployment schedule. DTSC's treatment of these conversations and correspondence as if they do not exist purely because they were not included within the four corners of the draft cover

basis to a new location. The new, interim location will facilitate effective performance of the leachate collection system and not be impacted by the ETLF conditions or unrelated landfill settlement."); Draft Removal Action Workplan, Protect Cell 8A from Intrusion of Elevated Temperature Landfill Event, Jul. 1, 2025, section 2.5 ("The primary goal/objective of this removal action is to prevent the spread of the ETLF to Cell 8A.").

³⁸ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 6.

³⁹ See, e.g., Revised Draft Removal Action Workplan, Extension of Covered Area, Oct. 3, 2025, sections 2.2, 3.1, 4.3, and 4.4.

⁴⁰ See Review of Draft Removal Action Workplan, Imminent and Substantial Endangerment Determination and Order (Docket No. HAS-FY24/25-082), Task 7 – Extension of Covered Area (Site Code 302132), Aug. 4, 2025, Specific Comment #3 ("This section of the Draft RAW must clarify that the goals/objectives of the remedial efforts are (a) to cover all areas of the landfill which are not presently covered by a geomembrane and to which the reaction area has expanded or has the potential to expand in order to adequately control infiltration of oxygen and water into the landfill waste, and (b) to control production of gas emissions, odors, and leachate.")

⁴¹ See Draft Removal Action Workplan, Extension of Covered Area, May 16, 2025; see also Revised Draft Removal Action Workplan, Extension of Covered Area, Oct. 3, 2025. *Contra* DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 3-4.

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 14 of 39

RAW severely discounts the immense effort Chiquita has made to deploy the geomembrane cover as quickly as feasible using the best installation methods that are protective of existing mitigation measures. Nowhere does the ISE Order state that these conversations and correspondence must be incorporated into the draft RAW to satisfy the ISE Order's requirements.

Chiquita's draft cover RAW addresses all requirements set forth in section 5.3 of the ISE Order. Contrary to DTSC's assertions, Chiquita's draft cover RAW included a detailed implementation schedule consistent with section 5.3(n); a design and implementation plan consistent with section 5.3(c); goals to be achieved by the additional geomembrane cover, consistent with section 5.3(b); a site description consistent with section 5.3(a); and a description of the methods to be employed, consistent with section 5.3(e).⁴² The following subsections address each deficiency alleged in the Notice.

i. Chiquita provided an implementation schedule that was as detailed as possible in satisfaction of section 5.3(n) of the ISE Order.

Chiquita disputes DTSC's claim that it "ignored DTSC's many instructions to provide a detailed schedule for installation of the geomembrane cover in the Cover RAW, as required under Section 5.3(n) of the Order."⁴³ Chiquita did not ignore DTSC's instructions to provide a detailed schedule. Chiquita addressed DTSC's scheduling demands directly and overtly in writing and verbally.⁴⁴ Chiquita provided a detailed implementation schedule covering the deployment of geomembrane cover in Segments 1 through 3 in section 3.2 of its initial draft cover RAW submitted on May 16, 2025.⁴⁵ In response to DTSC's comments dated August 4, 2025, requesting Chiquita to include a "comprehensive schedule that will accomplish installation of the geomembrane expeditiously," Chiquita submitted a revised draft cover RAW with a further detailed implementation schedule.⁴⁶ This implementation schedule covered the deployment of geomembrane cover in the remaining segments in Table 1 of its revised draft cover RAW submitted on October 3, 2025.⁴⁷ The revised draft cover RAW provided a completion date of November 2026 for Segments 4 through 15, and a completion date of "TBD" for Segments 16 through 20, further explaining that "Timing is subject to field conditions and can be affected by weather conditions that pose a risk to safety (e.g., high wind, rain), other agency directed work in the same area, or availability of materials or work

⁴² See Revised Draft Removal Action Workplan, Extension of Covered Area, Oct. 3, 2025, sections 2.1, 2.3, 3.0, 3.2, 4.3, Table 1, and Appendices N and O. *Contra* DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 3-7.

⁴³ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 4.

⁴⁴ See Chiquita Canyon, LLC's Response to U.S. EPA's, DTSC's, and the LEA's Requirement to Expand the Geomembrane Cover, Aug. 15, 2025; Chiquita Canyon, LLC Response to DTSC Request for Updated Geomembrane Cover Deployment Schedule, Nov. 7, 2025; Chiquita Canyon, LLC Response to DTSC Comments on Draft Removal Action Workplan: Protect Cell 8A from Intrusion of Elevated Temperature Landfill Event, Nov. 21, 2025; and Chiquita Canyon, LLC Response to LEA's Comments on the Revised Draft Removal Action Workplan: Extension of Covered Area, Dec. 15, 2025, provided in Attachment C.

⁴⁵ See Draft Removal Action Workplan, Extension of Covered Area, May 16, 2025, section 3.2.

⁴⁶ See Review of Draft Removal Action Workplan, Imminent and Substantial Endangerment Determination and Order (Docket No. HAS-FY24/25-082), Task 7 – Extension of Covered Area (Site Code 302132), Aug. 4, 2025, Specific Comment #5; see also Revised Draft Removal Action Workplan, Extension of Covered Area, Oct. 3, 2025, Table 1 and Appendix A.

⁴⁷ See Revised Draft Removal Action Workplan, Extension of Covered Area, Oct. 3, 2025, Table 1.

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 15 of 39

crews.”⁴⁸ DTSC then directed Chiquita in an email request on October 31, 2025 to “expedite” deployment of the geomembrane cover and submit an “updated comprehensive cover installation schedule” that includes “the full main canyon including deployment areas D16-D20, including all of cells 5, 6 and 8.”⁴⁹ In further response to DTSC and other regulators’ inquiries, Chiquita provided correspondence on November 7, 2025 explaining that expediting the deployment of geomembrane cover over the requested area was not feasible and would set back Chiquita’s progress on mitigating the reaction.⁵⁰ In response to DTSC’s request for a Master Schedule in its comments on the draft barrier RAW, Chiquita nevertheless accelerated its deployment schedule by implementing a new deployment strategy that would enable the cover to be fully deployed by July 31, 2027, subject to weather conditions.⁵¹ DTSC’s disagreement with Chiquita’s responses does not equate to Chiquita ignoring DTSC.⁵²

As Chiquita has explained repeatedly, it is not feasible to deploy the geomembrane cover any faster than the current rate.⁵³ To date, DTSC has failed to provide data or other evidence in response to Chiquita’s explanations and concerns that attempts to deploy the geomembrane cover at a faster rate than proposed may significantly impair existing mitigation measures. DTSC’s request is neither reasonable nor feasible, for the reasons explained above and in Chiquita’s previous correspondence with DTSC, and thus Chiquita has good cause not to comply with DTSC’s request.

Chiquita further disputes DTSC’s characterization of the scope of its comments on Chiquita’s schedule. DTSC’s Notice states, “Despite the Order’s text and the additional direction in the August 4, 2025 comment letter, [Chiquita] continued to propose a piecemeal plan to install the cover in five (5) acre segments without covering the entirety of the landfill where the SET event could impact the waste.”⁵⁴ But neither the ISE Order nor DTSC’s August 4, 2025 comment letter include the directives that DTSC claims. Section 5.3(n) of the ISE Order requires “[a] detailed schedule for implementation of the removal action consistent with the schedule contained in the approved Workplan including procurement, mobilization, construction phasing, sampling, facility startup, and testing[.]” The ISE Order does not provide further instruction on what DTSC would consider an adequate schedule. DTSC’s August 4, 2025 comment letter states the following, in relevant part:

Section 3.2 – Schedule: Several parts of this section must be updated. This section includes a schedule for the installation of the first 15 acres of geomembrane (identified in Figure 3 as “Initial

⁴⁸ *Id.* at n. 2. *Contra* DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 4.

⁴⁹ Email from D. Barclay (DTSC) to K. Logan (Chiquita), RE: CCL: Request to Delay Deployment of Final Portion of Segment 3 of Geomembrane Cover (Docket No. HSA-FY24/25-082), Oct. 31, 2025.

⁵⁰ *See* Chiquita Canyon, LLC Response to DTSC Request for Updated Geomembrane Cover Deployment Schedule, Nov. 7, 2025.

⁵¹ Chiquita Canyon, LLC Response to DTSC Comments on Draft Removal Action Workplan: Protect Cell 8A from Intrusion of Elevated Temperature Landfill Event, Nov. 21, 2025, Attachment A. *Contra* DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 5 (claiming Chiquita’s proposed schedule in its November 21, 2025 letter was not accelerated).

⁵² *Contra* DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 4.

⁵³ *Supra* n. 47.

⁵⁴ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 4.

Supplemental Geomembrane Deployment Area”) to be installed in three (3) segments (five acres each identified as Segments 1, 2 and 3). The ISE Order states that “*Respondents shall install a DTSC-approved landfill cover on all areas of the Site which are not presently covered by a geomembrane and to which the reaction area has expanded or has the potential to expand.*” Update the schedule to include installation dates as specified above; DTSC directs Respondents to provide a comprehensive schedule that will accomplish installation of the geomembrane expeditiously.

DTSC August 4, 2025 comment letter does not explain what it considers to be an “expeditious” schedule. It also fails to acknowledge the conflicting understanding that Chiquita currently has in place with EPA to deploy the geomembrane cover over 100 acres of the Landfill, and the many discussions Chiquita had with EPA, DTSC, and the LEA to determine how deployment should be prioritized and over which areas, which directly determined the areas identified in Chiquita’s draft RAW and deployment schedule.⁵⁵

Chiquita also disputes DTSC’s claim that the draft cover RAW “did not attempt to describe how [Chiquita] would optimize and accelerate cover installation such as by installing cover contemporaneously across distinct areas of the site.”⁵⁶ Chiquita described how it would optimize and accelerate cover installation to the extent feasible in its November 7 and November 21, 2025 letters to DTSC and its December 15, 2025 letter to the Local Enforcement Agency, on which DTSC was copied.⁵⁷ Chiquita explained that it was not feasible to install cover contemporaneously across areas of the Landfill because deploying the geomembrane cover expeditiously is not a matter of maximizing the number of drill rigs and liner crews that can fit onsite to complete the work all at the same time; rather, it is a matter of working deliberately and meticulously to not disrupt the gas infrastructure and other existing mitigation measures, as having to perform repairs on the gas infrastructure and other existing mitigation measures themselves would require Chiquita to pause deployment. To maintain the integrity of the gas infrastructure and existing mitigation measures, Chiquita must deploy the geomembrane cover at a careful and diligent rate while still working as expeditiously as possible to avoid delays in the first place. Chiquita has therefore satisfied this requirement and provided this detail to the agencies. If DTSC’s concern is that this description is not included in the draft RAW, Chiquita will revise the draft RAW to incorporate. DTSC has never previously requested such information be included in the draft RAW until this Notice.

⁵⁵ See, e.g., Chiquita Canyon, LLC’s Response to U.S. EPA’s, DTSC’s, and the LEA’s Requirement to Expand the Geomembrane Cover, Aug. 15, 2025.

⁵⁶ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 4.

⁵⁷ See Chiquita Canyon, LLC Response to DTSC Request for Updated Geomembrane Cover Deployment Schedule, Nov. 7, 2025; Chiquita Canyon, LLC Response to DTSC Comments on Draft Removal Action Workplan: Protect Cell 8A from Intrusion of Elevated Temperature Landfill Event, Nov. 21, 2025; and Chiquita Canyon, LLC Response to LEA’s Comments on the Revised Draft Removal Action Workplan: Extension of Covered Area, Dec. 15, 2025.

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 17 of 39

Chiquita disagrees with DTSC's suggestion that the reaction area has expanded or has the potential to expand to Module 5, Cell 6, or Cell 8 of the Landfill.⁵⁸ As described above, the reaction conditions remain stable, in a general equilibrium, and in some places are cooling, and Chiquita expects the reaction conditions to remain stable for the foreseeable future based on current reaction data. There is no data or other evidence supporting a potential for expansion of the reaction area to include Module 5, Cell 6, or Cell 8, and therefore no basis for requiring geomembrane coverage of those areas.

Finally, DTSC's Notice contradicts its November 21, 2025 letter on this same subject. On November 21, DTSC stated that it rescinds its November 18, 2025 letter and the requirements listed therein.⁵⁹ The November 18, 2025 letter had requested a more detailed and specific schedule for the 100 acres that Chiquita had already agreed to cover and set interim deadlines for setting this schedule.⁶⁰ It stated that if it did take such steps, "the next step in this process may be DTSC finding the Respondents out of compliance with the ISE Order and starting the enforcement of the penalty phase of the order."⁶¹ Then, three days later, DTSC reversed course, rescinded its November 18, 2025 letter, and directed Chiquita to comply with a November 20, 2025 LEA letter establishing a deadline for installation of a geomembrane cover at Chiquita.⁶²

Since DTSC rescinded its November 18, 2025 letter, Chiquita understood that it did not need to provide any further specification or detailed schedule at this time to DTSC. Instead, Chiquita is working on a separate track with the LEA on its directive. This again demonstrates the confusing and unfair burden placed on Chiquita to navigate its multiple regulators and their changing positions. DTSC's Notice is inconsistent with its November 21 letter and should be withdrawn.

⁵⁸ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 4-5 (directing Chiquita to deploy the geomembrane cover over Module 5 and Cells 6 and 8).

⁵⁹ See DTSC Imminent and Substantial Endangerment and Order (Docket No. HAS-FY24/25-082), Task 7, Extension of Covered Area, Schedule (Site Code 302132), Nov. 21, 2025 ("In light of the Local Enforcement Agency (LEA) letter that was sent to Respondents yesterday, November 20, 2025, establishing a deadline for installation of the geomembrane cover at CCL, DTSC rescinds the November 18, 2025, letter and the requirements listed therein.").

⁶⁰ See DTSC Imminent and Substantial Endangerment and Order (Docket No. HAS-FY24/25-082), Task 7, Extension of Covered Area, Schedule (Site Code 302132), Nov. 18, 2025 ("Without a specific and detailed schedule for the 100-acre cover area that the Respondents have already delineated in their segment map, the next step in this process may be DTSC finding the Respondents out of compliance with the ISE Order and starting the enforcement of the penalty phase of the order.").

⁶¹ *Id.*

⁶² Supra n. 63; see also LEA Comments on the Response Letters and the Draft Removal Action Workplan to Address the Extension of Covered Area Submitted by Chiquita Canyon Landfill (CCL), SWIS No. 19-AA-0052, Nov. 20, 2025, provided as Attachment D.

ii. Chiquita included all relevant criteria, plans, and specifications in satisfaction of section 5.3(c) of the ISE Order.

Chiquita's draft cover RAW included sufficient details regarding design and implementation plans for the geomembrane cover, consistent with the requirements of section 5.3(c) of the ISE Order.⁶³ Section 5.3(c) directed inclusion of the following:

A Design and Implementation Plan. The design portion of the plan shall include, at a minimum, relevant criteria and final plans and specifications. The implementation portion of the plan shall detail, at a minimum, the techniques and methods to implement the removal activities, including any excavating, storing, handling, transporting, treating, and disposing of material on or off the Site.

The draft cover RAW included substantial details regarding the design and implementation of the cover. It explained that Chiquita's installation of the additional geomembrane cover will proceed in a phased approach, which is critical for ongoing management of the ETLF event. To install a section of cover, all LFG extraction wells and pumps in that section must be taken offline, and the offline wells will not extract gas and the offline pumps will not extract liquid during the offline period. Previous installation efforts have shown that even temporary cessation of gas and liquid extraction has an immediate and measurable impact. To minimize the number of offline wells and pumps at any given time, the draft cover RAW proposes to install the additional geomembrane cover in approximately five-acre segments. The area shaded in darker green (approximately 15 acres) in Figure 3 of the draft cover RAW is Chiquita's proposed initial deployment of the geomembrane cover (segments D01-D03). The draft cover RAW also noted that the area to be covered requires preparation including grading. If a rainstorm occurs during this process, much of the prep work will need to be redone. Proceeding with this work would have a high risk of lengthening the time during which wells are offline. Instead, to continue making progress during the rainy season, the draft RAW proposes to conduct repairs on approximately 16.4 acres of the existing 30-mil HDPE geomembrane using the new 60-mil EVOH/HDPE geomembrane. Following the rainy season and completion of the repairs outlined above, the draft RAW explained that Chiquita would then proceed with installing the EVOH/HDPE geomembrane cover. The area shaded in lighter green in Figure 3 of the draft cover RAW is the remainder of the expansion area divided into five-acre segments. Other segments will receive geomembrane in accordance with the approximate schedule presented in Table 1.⁶⁴

The draft cover RAW provides an extensive discussion of the work to be done to prepare the deployment area and install the geomembrane cover. This discussion is specific to actual site

⁶³ See Revised Draft Removal Action Workplan, Extension of Covered Area, Oct. 3, 2025, section 3.0. *Contra* DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 5-6.

⁶⁴ For more discussion, see Revised Draft Removal Action Workplan, Extension of Covered Area, Oct. 3, 2025, section 3.1.

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 19 of 39

conditions at the Landfill and tailored to meet the ongoing needs of the existing mitigation measures.⁶⁵ For example, preparation of the deployment area will include:

- Clearing, grubbing, and further preparing the work area, including removing the green waste and vegetation;
- Preparing the subgrade to receive the 60-mil EVOH/HDPE geomembrane;
- Regrading existing benches and slopes (as needed) to ensure proper drainage;
- Installing vertical LFG collectors per the Updated Design and Installation Schedule of the Gas Collection and Control System Well Field Expansion Plan (Appendix H of the draft cover RAW). This plan was revised on October 3, 2025, to reflect changes resulting from this draft RAW;
- Installing surface LFG collectors to ensure proper distribution of vacuum to the underside of the geomembrane. This project will use the same surface collector design as that used for the existing geomembrane. The design is illustrated in Appendix I of the draft cover RAW. Collector positions will be located in the field and spaced no greater than 100 feet apart. Note that the gravel shown on the bench roads is part of the collector and is not part of the access road. All access road gravel is installed over the geomembrane with an underlying geotextile to protect against punctures and abrasion;
- Installing toe drains for segments where geomembrane is installed on slopes. The toe drain will be located at the toe of the slope under the geomembrane and inside of the anchor trench. Temporary sumps will be located at the low end of each toe drain and connected to the LFG condensate system (the initial deployment area will not require any toe drains); and
- Disconnecting and temporarily removing LFG headers and laterals in the deployment area.⁶⁶

Geomembrane installation will include:

- Geomembrane pipe boots around vertical collectors;
- Continuous seaming between the existing geomembrane and the new geomembrane;
- Placement of geotextile and gravel access roads where needed (locations will be determined in the field by operations personnel);
- Placement of sandbag ballast in other areas to prevent geomembrane uplift by wind; and
- Re-installation of LFG headers and laterals over the geomembrane.⁶⁷

The draft cover RAW additionally includes several Appendices providing additional design and implementation specifics, including Appendix J (specifications and CQA requirements used for

⁶⁵ See Revised Draft Removal Action Workplan, Extension of Covered Area, Oct. 3, 2025, at 8-10.

⁶⁶ See Revised Draft Removal Action Workplan, Extension of Covered Area, Oct. 3, 2025, at 8.

⁶⁷ *Id.*

installation of the 60-mil EVOH/HDPE geomembrane cover) and Appendix K (typical road cross-sections and details that are used by the contractors as guides).⁶⁸

Chiquita disputes DTSC's characterization of these plans as being "too generalized to be fit for the specific work," and disputes DTSC's characterization of its General Comment #1 in its August 4, 2025 comment letter as reflecting such. Once again, DTSC's Notice alleges a requirement that was never previously communicated to Chiquita. Nowhere in DTSC's General Comment #1 does the department state or even imply that the plans Chiquita provided were "too generalized." General Comment #1 merely directs Chiquita to include specifications of products that are to be constructed or installed as a call-out in standalone sections or appendices of the draft RAW. DTSC's General Comment #1 states the following, in relevant part:

Specifications and Cross-Sections: Specifications of products that are to be constructed or installed with this removal action must be called out in standalone sections of the Draft RAW or in appendices that are specific to this RAW, not sheets from other submittals. Cross-sections that are to be developed for this removal action must be included in the Draft RAW and not simply by reference to other plans.

If the specifications and/or cross-sections are not included in the Draft RAW as standalone items, there is no way to confirm if those items are being included in the removal action. For example, Appendix G calls out "Section 02771" and "Cell 7 Liner Construction"; these have nothing to do with the geomembrane cover associated with this Draft RAW.

The types of cross-sections that are expected to be included, at a minimum, are:

- a) Road Cross-Sections [...]
- b) Pipe Road-crossings [...]
- c) Joint Trench and Electricity Crossings [...]
- d) Tie Downs and Anchoring [...]
- e) Permanent and Semi-Permanent Structures [...]
- f) Footings [...]

General Comment #1 also directs Chiquita to include six types of cross-sections in the revised draft RAW. Chiquita responded to DTSC's comments and included all six in Appendices A and K and section 3.1 of the draft RAW.⁶⁹

Further, as stated above, Chiquita's revised draft RAW reflects EPA's July 24, 2025 letter, issued pursuant to EPA's authority under Paragraph 90 of the UAO, requiring Chiquita to expand the

⁶⁸ *Id.* at 9.

⁶⁹ See Revised Draft Removal Action Workplan, Extension of Covered Area, Oct. 3, 2025, section 3.1 and Appendices A and K.

geomembrane cover consistent with the 2025 LEA Compliance Order, and Chiquita's response to that letter.⁷⁰ The revised draft RAW contains all of the plans and specifications relating to these 100 acres of the Landfill. The ISE Order directly conflicts with Chiquita's agreement with EPA, which DTSC was aware of.⁷¹ If DTSC takes issue with the extent of Chiquita's proposed coverage, DTSC must work with both EPA and Chiquita to come to an agreement on the portion of the landfill that should be covered.

As DTSC pointed out, Chiquita's revised draft RAW also reflects the commitment to provide a hydrology analysis in the next update to the RAW. Before this Notice, DTSC had not directed Chiquita to further update the revised draft RAW. As such, Chiquita had not yet provided the hydrology analysis but intends to do so during the month of January 2026.

iii. Chiquita adequately identified the goals to be achieved in satisfaction of section 5.3(b) of the ISE Order.

As described above, the first time DTSC stated that Chiquita must "reference the SET event/landfill reaction in the Goals and Objectives section" was in this Notice. DTSC's prior comments did not specify that Chiquita's draft RAW must make this reference to satisfy section 5.3(b), nor does the ISE Order make such a specification. Chiquita's stated goals "to extend the area of the Landfill provided with a geomembrane cover" and "to improve LFG collection and thereby minimize emissions and reduce odors" therefore satisfy the requirements of section 5.3(b) and directly address DTSC's August 4, 2025 comments. Chiquita's stated goals clearly relate to the landfill reaction. Chiquita cannot be expected to comply with a requirement to include specific language that had not previously been communicated to Chiquita. Chiquita will revise the draft RAW to more explicitly reference the landfill reaction in the Goals and Objectives section.

iv. Chiquita provided a site description that includes current site conditions in satisfaction of section 5.3(a) of the ISE Order.

Chiquita's draft cover RAW included an accurate description of current site conditions, consistent with the requirements of section 5.3(a) of the ISE Order.⁷² Chiquita provided a robust site description based on the copious data streams monitored and measured at the Landfill that is reflective of current site conditions. DTSC appears to disagree with Chiquita's assessment of such site conditions. DTSC alleges that the draft cover RAW does not provide an accurate description

⁷⁰ See Additional Work Required Under UAO for Geomembrane Cover Expansion, Jul. 24, 2025, provided in Attachment E; Chiquita Canyon, LLC's Response to U.S. EPA's, DTSC's, and the LEA's Requirement to Expand the Geomembrane Cover, Aug. 15, 2025.

⁷¹ See Chiquita Canyon, LLC's Response to U.S. EPA's, DTSC's, and the LEA's Requirement to Expand the Geomembrane Cover, Aug. 15, 2025.

⁷² See Revised Draft Removal Action Workplan, Extension of Covered Area, Oct. 3, 2025, sections 2.1, 2.2, and 2. *Contra* DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 6.

of current site conditions because it “does not accurately depict the extent of the SET event and the expanding reaction.”⁷³

Each draft RAW must include design criteria, plans, and specifications that are prepared by a California licensed civil engineer.⁷⁴ Chiquita and its experts and consultants, including its California licensed civil engineer, carefully reviewed and prepared the description of current site conditions. Chiquita cannot require those independent experts to reflect DTSC’s perceived extent of the reaction and current site conditions if those independent experts do not agree with DTSC’s assessment. As DTSC itself acknowledged in its December 12, 2025 Notice of Proposed Determination of Noncompliance, it did not apparently have the full data set it believed it needed to fully assess the reaction.⁷⁵ While Chiquita disagrees with that assertion, Chiquita provided the additional requested data on December 22 and 23, 2025.

Chiquita’s independent experts provided a characterization of current site conditions supported by all available data, expert reports, and actual landfill operations. DTSC takes particular issue with Chiquita premising its characterization of current site conditions on the “findings of the Reaction Committee.”⁷⁶ The crux of DTSC’s issue with relying on the Reaction Committee Determinations was that DTSC did not have access to the “raw data” referenced in those reports and thus the findings were “unverifiable.”⁷⁷ This is not the same as saying that Chiquita did not describe current site conditions. Chiquita provided a detailed description of current site conditions in its draft cover RAW, consistent with the requirements of section 5.3(a) of the ISE Order, and Chiquita has given DTSC access to all raw data for it to review and independently confirm such assessment.

v. Chiquita included an adequate description of cover installation methods in satisfaction of section 5.3(e) of the ISE Order.

Section 5.3(e) of the ISE Order requires Chiquita to include “[a] description of methods that will be employed during the removal action to ensure the health and safety of workers and the public during the removal action.” DTSC alleges that the draft cover RAW does not comply with this requirement because the RAW does not describe the new deployment process being implemented by Chiquita to minimize the potential for on-site odors.⁷⁸ At the time Chiquita submitted the first draft cover RAW and the revised draft cover RAW (May 16 and October 3, 2025, respectively), the cover installation methods described in the draft RAWs were entirely accurate. Chiquita began implementing this new deployment process after observing an increase in on-site odors as a result of taking all LFG extraction wells and dewatering pumps offline in the active cover deployment areas. Chiquita informed DTSC in subsequent correspondence that in order to avoid these potential negative impacts, it had begun employing a new deployment process that enables the wells and

⁷³ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 6.

⁷⁴ ISE Order § 5.3(g).

⁷⁵ DTSC Notice of Proposed Determination of Noncompliance, Dec. 12, 2025, at 5.

⁷⁶ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 6.

⁷⁷ See Review of Draft Removal Action Workplan, Protect Cell 8A from Intrusion of Elevated Temperature Landfill Event, Imminent and Substantial Endangerment Determination and Order (Docket No. HAS-FY24/25-082), Task 10, Protect Cell 8A from Intrusion of Subsurface Elevated Temperature Event (Site Code 302132), Oct. 15, 2025, at 4.

⁷⁸ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 6-7.

pumps in active cover deployment areas to be offline for the least amount of time possible and that Chiquita needed additional time to fully evaluate and further develop this process.⁷⁹

Chiquita did not begin employing the new method of cover installation described in its November 7, 2025, November 21, 2025, and December 15, 2025 letters and in discussions with DTSC on November 12, 2025, until after Chiquita's submittal of the revised draft RAW on October 3, 2025. As such, the description of cover installation methods described in both the May 16 and October 3, 2025 draft RAWs satisfied section 5.3(e) of the ISE Order because they accurately reflected the cover installation methods employed at the time of submission. Chiquita cannot be expected to comply with a requirement to include specific language that had not previously been communicated to it. Chiquita will revise the draft RAW to provide more description of this new deployment process.

b. Chiquita submitted a satisfactory relocation RAW.

Chiquita's relocation RAW satisfied the ISE Order's requirements; included all relevant criteria, plans, and specifications; and addressed DTSC's comments.⁸⁰ DTSC's assertion that Chiquita did not submit a satisfactory relocation RAW relies on false allegations, ignores Chiquita's extensive good-faith engagement with DTSC and other federal, state, and local regulators regarding the new tank farm's (Tank Farm 13) location, and ignores the totality of the circumstances surrounding the reaction and Chiquita's efforts to effectively manage it.

DTSC's specific allegations are addressed in turn below. First and most importantly, Cell 8B allowed Tank Farm 9's prompt relocation to a location at the Landfill that is currently stable and that Chiquita and its experts expect to remain stable for the foreseeable future based on current reaction data.⁸¹ Cell 8B was the most environmentally protective location at the Landfill, and it was the only location that was acceptable to certain regulators, including DTSC (at least initially) and CalRecycle. Second, contrary to DTSC's allegations in the Notice, Chiquita provided compaction data demonstrating that Tank Farm 13's construction met compaction standards and provided a slope stability analysis further demonstrating that the new location is stable. Third, DTSC's allegation that Chiquita did not address DTSC comments because the version of Chiquita's Leachate Management Plan (LMP) submitted to DTSC in September 2025 did not reflect Tank Farm 13's final, as-built conditions fails because, among other things, the LMP is a requirement of EPA's UAO and DTSC has no jurisdiction over its contents and Tank Farm 13's construction was not complete at the time of the submission so it could not have been included in the September 2025 submission. Since Chiquita's relocation RAW satisfies the ISE Order's

⁷⁹ See Chiquita Response to DTSC Request for Updated Cover Deployment Schedule, Nov. 7, 2025, at 2-3.

⁸⁰ See Revised Draft Removal Action Workplan, Interim Relocation and Stabilization of Containerized Waste, Sep. 19, 2025; June 3, 2025 email from K. Logan to P. Ruttan transmitting Compaction memo; Nov. 25, 2025 email from K. Logan to T. Crick, P. Ruttan, and B. Floyd transmitting stability analysis; June 3, 2025 Summary of Compaction Test Results. *Contra* DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 7-9.

⁸¹ See the most recent Monthly Reaction Committee Determination on Reaction Area Boundary, submitted on January 9, 2026, for the month of December 2025, in accordance with SOFA Condition Nos. 9a and 9b.

requirements, DTSC should withdraw its Notice.

- i. The relocation of Tank Farm 9 to Cell 8B satisfies section 5.1.2(b) of the ISE Order because Cell 8B was the only available option for the prompt relocation of Tank Farm 9, it was the most environmentally protective location, and it is currently stable.**

DTSC's allegation that the relocation of Tank Farm 9 to Cell 8B fails to satisfy the ISE Order ignores over two years of Chiquita's constant engagement with DTSC and other federal, state, and local regulators regarding its good faith efforts to effectively manage the reaction, in part, by constructing a tank farm that will satisfy the requirements for Conditional Authorization to treat the leachate under California's tiered hazardous waste permitting program. Once DTSC required that Tank Farm 9 be relocated under the ISE Order, it became further apparent that Cell 8B was the only feasible location that would meet regulators' demands and constraints and simultaneously comply with the ISE Order as the most environmentally protective location at the Landfill.

Additionally, Cell 8B was the only location at the Landfill (other than Cell 7, which became unacceptable due to public opposition during location discussions with the regulators) that would provide sufficient space for the new tank farm. Cell 8B was also the only location at the Landfill that would allow the new tank farm to be constructed in the near term due to permitting constraints on other locations, such as the Wolcott Way location (which also faced substantial public opposition), and to achieve Tank Farm 9's prompt relocation to a stable location at the Landfill as contemplated by the ISE Order.

A. The history of Tank Farm 9.

As an initial matter, it is important to understand the evolution of Chiquita's leachate management practices as influenced and directed by its regulators, such as DTSC, and the history of Tank Farm 9. Due to DTSC's early stated concerns with comingling leachate from extraction wells from different areas of the Landfill during Chiquita's initial response to the reaction and increased leachate production in early 2024, Chiquita developed a group system for the extraction wells—Groups A, B, North, and East. Due in part to DTSC's initial instructions that a tank could only manage leachate from one extraction well group (e.g., once a tank managed leachate from Group A, that tank could only be used to manage leachate from Group A wells going forward), Tank Farm 9 was ultimately located on the Landfill's top deck to accommodate leachate collection and treatment needs while managing the leachate from the different well groups in dedicated tanks as instructed by DTSC. As leachate production and extraction increased, the logistics of managing the leachate from the different well groups in dedicated tanks required the acquisition and placement of additional tanks in Tank Farm 9. Accordingly, Tank Farm 9 might not have ultimately come to be located on the Landfill's top deck or it might have looked quite different had DTSC's initial instructions not focused on managing leachate from different extraction well groups in dedicated tanks.⁸²

⁸² During formal recharacterization, compatibility was also established, allowing commingling of compatible wastes and reducing administrative and logistical burdens.

B. Planning, designing, siting, and constructing the new tank farm.

In late 2024, as Chiquita continued its efforts to design, site, and construct the new tank farm, it began more extensive discussions with the Los Angeles County Fire Department (the Certified Unified Program Agency or CUPA) and other state and local regulators, including DTSC, regarding the new tank farm's location.⁸³ These discussions ultimately resulted in the January 28, 2025 meeting and site visit to the Landfill where Chiquita and many state and local regulators discussed, among other things, the new tank farm's location. In addition to Cell 8B, Canyon B and Wolcott Way were identified as potential locations for the new tank farm in 2024. However, both Canyon B and Wolcott Way were less environmentally protective than Cell 8B and both presented logistical challenges rendering them impractical and/or unacceptable.⁸⁴

Chiquita notes that it had originally planned to construct the new tank farm in Canyon B and had even begun site prep for construction. However, after nearly six months of discussions with the CUPA, the CUPA informed Chiquita in December 2024 that other regulators expressed concern about Canyon B as the new tank farm's location.⁸⁵ While Canyon B is not physically connected to the Main Canyon, concerns were raised regarding whether Canyon B was formally closed. Wolcott Way would have required extensive permitting and regulatory approvals (e.g., Conditional Use Permit modification, and LEA and Regional Water Board permits and approvals, among others), some of which may have required CEQA analysis, that would not have allowed for Tank Farm 9's prompt relocation as contemplated by the ISE Order. Other alternate locations, including Wolcott Way, initially identified by regulators and provided to Chiquita by the CUPA were unacceptable alternate locations because those locations were less environmentally protective than Cell 8B and the logistics of constructing and operating the new tank farm in those locations were entirely unworkable.

Chiquita repeatedly sought guidance from the regulators about potential locations at the Landfill for the new tank farm, but it did not receive any significant guidance until March 6, 2025, months after it first asked. The March email transmitting the regulators' collective feedback from the

⁸³ See, e.g., Jul. 2, 2024 Outlook calendar meeting invite, Chiquita -- On-Site Leachate Treatment; Jul. 19, 2024 email from S. Cassulo to the CUPA with copy to DTSC, CCL Conditional Authorization Update; Sep. 6, 2024 email from D. Smith to the CUPA, CCL - Proposed CUPA Transmittal Email and Documents; Oct. 9, 2024 email from D. Smith to the CUPA, CCL - Conditional Authorization Progress Update; Oct. 23, 2024 email from S. Phillips to EPA with copy to DTSC, CCL Conditional Authorization Update to CUPA; Nov. 6, 2024 email from D. Smith to the CUPA, CCL - Conditional Authorization Progress Update; Nov. 20, 2024 email from D. Smith to the CUPA, Chiquita Canyon Landfill (CCL) - Conditional Authorization Progress Update; Nov. 27, 2024 email from S. Phillips to EPA and DTSC, Chiquita Canyon Landfill (CCL) - Conditional Authorization Progress Update; Dec. 12, 2024 email from D. Smith to the CUPA, CCL - Conditional Authorization Update; Dec. 17, 2024 email from D. Smith to the CUPA, CCL - Post Site Visit Update.

⁸⁴ See Jan. 31, 2025 email from J. Perkey to EPA and the CUPA with copy to Los Angeles County Counsel, CalRecycle, DTSC, the Los Angeles Regional Water Quality Control Board, the LEA, Los Angeles County Department of Regional Planning, Los Angeles County Public Works, and South Coast Air Quality Management District, transmitting Chiquita's memorandum, Summary of Tank Farm Options and Approval Requirements.

⁸⁵ See Email from T. Quiaoit (CUPA) to D. Smith, Dec. 19, 2024; Email from E. Morofuji (Public Health) to S. Cassulo, Dec. 18, 2024.

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 26 of 39

January 28, 2025 site visit and discussion of potential locations for the new tank farm contained the following statement: “we are not able to suggest or recommend a site [for the new tank farm], but have instead provided criteria for a site that will likely facilitate the necessary permits and approvals.”⁸⁶ As the regulators knew, there was no available option at the Landfill that met all criteria. To date, Chiquita and the regulators have been unable to identify such an option.

Prior to and after the ISE Order, Chiquita clearly conveyed to the regulators that Cell 8B was the best location for the new tank farm because the other locations did not work for various reasons, including environmental protection and space issues.⁸⁷ Chiquita proceeded with Cell 8B construction and held weekly technical calls with DTSC and often CalRecycle. CalRecycle’s Todd Thalhammer agreed that Cell 8B was a good interim location for the new tank farm. It was under Mr. Thalhammer’s direction and DTSC’s verbal agreement that Chiquita proceeded with Cell 8B as the interim location for the new tank farm with the understanding, at that time, that the final location would be Cell 7. Chiquita finalized its design and construction plans in accordance with this understanding. However, community opposition to Cell 7 as the final location for the new tank farm prior to issuance of the ISE Order ultimately resulted in the regulators’ inability to support Cell 7 as the new tank farm’s final location.

The new tank farm requires an extensive amount of space that must be relatively flat, and the Landfill does not have that type of space anywhere else besides Cell 8B. As noted above, Chiquita initially planned to site the new tank farm in Canyon B but was told no. Since Canyon B was not an acceptable location for the new tank farm, Primary Canyon was also an unacceptable location for the new tank farm because it had the same concerns about formal closure of the old landfill. Accordingly, other than Cell 7 (which became an unacceptable option due to community opposition) and Wolcott Way (which also became an unacceptable option for the reasons described above), there is no other space at the Landfill that could accommodate the new tank farm’s space requirements.

C. Cell 8B is the most environmentally protective location at the Landfill that allowed for the prompt relocation of Tank Farm 9.

Cell 8B is the most environmentally protective location at the Landfill because a tank farm in Cell 8B is mostly gravity fed, meaning that minimal pumping of hazardous leachate under pressure is required to move the leachate to the tank farm. The Cell 8B location is also the most protective from wildfires. In addition, Cell 8B is located within the Landfill’s lined footprint so it provides “tertiary” containment (considering the new tank farm’s primary and secondary containment liners).

The other alternate locations identified by the regulators were outside of the Landfill’s footprint and would have required extensive pumping of hazardous leachate over significant distances and elevation of unlined and native land to reach the tank farm. In addition, the other alternate locations

⁸⁶ See Email from L. Lye to Chiquita, Los Angeles County Counsel, CalRecycle, DTSC, the Los Angeles Regional Water Quality Control Board, the LEA, Los Angeles County Department of Regional Planning, Los Angeles County Public Works, and South Coast Air Quality Management District, Mar. 6, 2025.

⁸⁷ See, e.g., supra n. 87.

were outside of the Landfill's ridgeline which rendered them more susceptible to wildfires. For example, Wolcott Way, one of the few alternative options with sufficient space, was the least environmentally protective location because of its proximity to the community and the Santa Clara River. The location would have necessitated pumping hazardous leachate under pressure up and over a ridge (over native, unlined land) to a tank farm right next to the highway.

D. Cell 8B is currently stable and is expected to remain stable for the foreseeable future.

Relocating Tank Farm 9 to Cell 8B was the only way to satisfy the ISE Order's requirement to relocate Tank Farm 9 to a stable location considering the totality of the circumstances surrounding the reaction and the need to promptly relocate Tank Farm 9's leachate tanks. Constructing the new tank farm in Cell 8B allowed for Tank Farm 9's relocation within the landfill to occur promptly, eliminate any imminent threats, and minimize any potential long-term threat to the leachate tanks from the reaction.

As discussed above, Chiquita disagrees that the reaction is expanding. According to the interpretation of current data by Chiquita's consultants, it is highly unlikely that the reaction could even begin to threaten Cell 8B for the foreseeable future considering the current location of the reaction impacts, the very small amount of waste located under a small portion of Tank Farm 13, and Chiquita's current reaction management measures that independent experts have confirmed are continuing to effectively manage and contain the reaction.⁸⁸ As discussed further below, Cell 8B is currently stable and will be so for the foreseeable future. Thus, relocating Tank Farm 9 to Cell 8B satisfied section 5.1.2(b) of the ISE Order because it promptly eliminated any imminent threat to the Tank Farm 9 leachate tanks and it minimized potential future threats to the leachate tanks. DTSC's allegation that Cell 8B may theoretically be subject to the reaction in the future ignores the totality of the circumstances surrounding Chiquita's management of the reaction and the limited options that Chiquita had for promptly relocating Tank Farm 9 leachate tanks to another portion of the Landfill as explained above.

E. Until the DTSC Notice, DTSC had indicated that Chiquita was in compliance with section 5.1.2(b) of the ISE Order.

Chiquita has been transparent with its plans and acted in good faith in its efforts to construct a tank farm that satisfies the requirements for Conditional Authorization and that resulted in Tank Farm 9's prompt relocation within the Landfill. Chiquita staff have met regularly with its regulators and have consistently updated them on these plans. This includes the 33 weekly technical meetings between DTSC and Chiquita following issuance of the ISE Order during which the tank farm was discussed routinely, including when there were no new developments. During this period, no regulators, including DTSC, ever instructed Chiquita to stop constructing the new tank farm in Cell 8B, nor has any regulator suggested additional alternate locations that Chiquita should

⁸⁸ See Declaration of C. Benson, *The People of the State of California and The County of Los Angeles v. Chiquita Canyon, LLC; Chiquita Canyon, Inc.; and Waste Connections US, Inc.*, Case No. 2:24-cv-10819-MEMF-MAR, ECF No. 82-5, provided as Attachment F. *Contra* DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 8.

consider.⁸⁹ Chiquita should not be threatened with noncompliance now, after substantial coordination and communication in which DTSC was silent on this exact point.

As described above, relocating Tank Farm 9 to Cell 8B was the only option that would satisfy section 5.1.2(b) of the ISE Order. Relocation to Cell 8B achieved the key goal of the ISE Order by providing the only practical, environmentally protective, and stable location at the Landfill for achieving the prompt relocation of Tank Farm 9. Since the relocation of Tank Farm 9 to Cell 8B satisfies section 5.1.2(b) of the ISE Order, DTSC should withdraw its Notice.

ii. Chiquita has provided all relevant criteria, plans, and specifications in satisfaction of section 5.3(c) of the ISE Order.

Chiquita disagrees with DTSC's allegation that it has not complied with section 5.3(c) of the ISE Order.⁹⁰ The Notice summarily states that Chiquita "failed to provide adequate documentation to prove that [it has] met compaction and other geotechnical standards for construction of the pad at Tank Farm 13 in the Relocation RAW," and it cites section 5.3(c) of the ISE Order as support.⁹¹ This allegation is false. Chiquita provided this documentation to DTSC on multiple occasions:

- On May 7, 2025, Chiquita emailed pre-construction soil compaction sample results for the soil placed in Cell 8B to DTSC's Peter Ruttan, Peter Gathungu, Perry Myers, and Tim Crick, copying DTSC's Dan Ziarkowski.⁹²
- On May 20, 2025, after meeting with DTSC on May 14, 2025, Chiquita emailed the most recent soil sample results, including lab test results and moisture/density test results for the soil placed in Cell 8B, to DTSC's Dan Ziarkowski, Peter Ruttan, and Tim Crick, copying five additional DTSC personnel.⁹³
- On June 3, 2025, in response to questions received from DTSC, Chiquita emailed a memorandum summarizing the pre-construction soil compaction sample results provided on May 7, 2025 to DTSC's Peter Ruttan, copying five additional DTSC and CalRecycle personnel.⁹⁴ The compaction memorandum—"Summary of Compaction Test Results – 2025 Cell 8 Tank Farm Project, Chiquita Canyon Landfill, Castaic, California"—begins by

⁸⁹ Chiquita notes that LA County Public Works issued stop work orders regarding grading permit issues in June 2025, which Chiquita is contesting, and the County has not moved to enforce the orders. Upon learning about the stop work orders, Wes Mindermann of CalRecycle expressed concern and directed Chiquita to continue work.

⁹⁰ See Revised Draft Removal Action Workplan, Interim Relocation and Stabilization of Containerized Waste, Sep. 19, 2025, section 3.1. *Contra* DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 8.

⁹¹ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 8.

⁹² See Email from K. Logan (Chiquita) to P. Ruttan (DTSC), et al., May 7, 2025.

⁹³ See Email from K. Logan (Chiquita) to P. Ruttan (DTSC), et al., May 20, 2025.

⁹⁴ See Email from K. Logan (Chiquita) to P. Ruttan (DTSC), et al., Jun. 3, 2025.

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 29 of 39

stating that it “summarizes the results of the compaction testing during the placement of engineered fill associated with the 2025 Cell 8 tank farm project.”

- On June 6, 2025, after Chiquita had shared the compaction memorandum, DTSC’s Peter Ruttan emailed Chiquita with a question regarding the amount of soil placed for the new tank farm, and Chiquita promptly answered the question.⁹⁵

In summary, DTSC received the soil compaction documentation over seven months ago and discussed questions regarding soil placed for the new tank farm with Chiquita around the time the compaction information was submitted. DTSC had numerous opportunities to raise any additional questions or concerns about the documentation, including during the routine weekly calls. DTSC never indicated that the compaction memorandum or the other relevant compaction information provided by Chiquita failed to adequately document how it met the compaction and other geotechnical standards for constructing the pad for Tank Farm 13.

In addition to the documentation described above, Chiquita submitted Tank Farm 13’s engineering assessment titled “Professional Engineer Hazardous Waste Tank System Assessment and Certification” in CalEPA’s California Environmental Reporting System (CERS) on November 20, 2025, as part of its Conditional Authorization notification. That same day, Chiquita emailed managers and staff from CalEPA, DTSC, EPA, and the CUPA to alert them that Chiquita had submitted its Conditional Authorization notification and that Chiquita was working to provide the CUPA with the tank system certification.⁹⁶ DTSC at the very least had knowledge of this engineering assessment and could have requested a copy. The assessment included, among other things, a construction quality assurance monitoring report for Tank Farm 13 that included the same soil compaction information. Again, DTSC did not raise any questions or otherwise object to the compaction information that Chiquita provided. Accordingly, Chiquita has always understood that it has provided adequate documentation demonstrating that it met the compaction and other geotechnical standards for constructing Tank Farm 13’s pad. To the extent that DTSC has specific comments or questions about the compaction documentation that Chiquita provided, Chiquita is willing to discuss further.

The Notice also claims that Chiquita failed to provide a slope stability analysis, as required by section 5.3(c) of the ISE Order. This allegation is also false. Chiquita provided the Tank Farm 13 stability analysis to DTSC on November 25, 2025, via an email to DTSC’s Tim Crick, Peter Ruttan, and Bridget Floyd.⁹⁷ To date, DTSC has not raised any questions or concerns regarding the slope stability analysis. As with the compaction documentation, to the extent that DTSC has specific comments or questions about the slope stability analysis, Chiquita is willing to discuss further.

Given the above, DTSC’s allegation that Chiquita did not provide all relevant plans, criteria, and specifications for the relocation RAW fails because it relies on false assertions that Chiquita failed to provide soil compaction and slope stability documentation, both of which were previously

⁹⁵ See Email from K. Logan (Chiquita) to P. Ruttan (DTSC), et al., Jun. 6, 2025.

⁹⁶ See Email from D. Smith (Chiquita) to D. Barclay and T. Berg (DTSC), et al., Nov. 20, 2025, Chiquita Canyon - Conditional Authorization Notification.

⁹⁷ See Email from K. Logan (Chiquita) to T. Crick (DTSC), et al., Nov. 25, 2025, Slope Stability Analysis - TF13.

provided to DTSC. DTSC has the information it needs to assess stability of the Cell 8B location.⁹⁸ DTSC's apparent belief that it does not have this information suggests that it is asserting Cell 8B is not a stable location in violation of the ISE Order without reviewing Chiquita's submittals or relying on the facts. To the extent DTSC's concerns are about the content of those documents, it should state this specifically and explain in detail what additional information is required so the parties can have a constructive dialogue about how to address DTSC's concerns. Thus, DTSC's allegation that Chiquita failed to provide all relevant criteria, plans, and specifications in satisfaction of section 5.3(c) of the ISE Order is unfounded and DTSC should withdraw its Notice.

iii. Chiquita addressed DTSC's comments regarding the relocation RAW.

Chiquita provided extensive, substantive responses to DTSC's comments on all three RAWs. The Notice alleges that Chiquita did not address DTSC's comments regarding the relocation RAW.⁹⁹ More specifically, the Notice alleges that Chiquita did not address or provide the information specified in DTSC's comments on the May 2025 draft relocation RAW, including compaction testing and material classification based on geotechnical testing prior to fill placement. As noted above, Chiquita provided this documentation to DTSC on multiple occasions. As noted in the summary soil compaction memorandum, soil compaction testing occurred prior to fill placement.¹⁰⁰ Chiquita's alleged failure to include this information as part of the revised RAW does not warrant this Notice because Chiquita had previously provided the information directly to DTSC at DTSC's request. If DTSC's concern is that the revised draft relocation RAW did not expressly state that soil compaction testing occurred prior to fill placement, Chiquita will revise the draft RAW to incorporate this information.

The Notice further alleges that Chiquita failed to provide an updated LMP as requested in DTSC's July 29, 2025 comment letter on the May 2025 draft relocation RAW.¹⁰¹ More specifically, DTSC alleges that the January 2025 LMP that Chiquita provided to DTSC was inadequate because it failed to include and reflect Tank Farm 13's as-built conditions. As an initial matter, Tank Farm 13 was still under construction in September 2025, so it was not possible to provide an LMP that reflected as-built conditions at that time. In addition, the LMP was prepared in response to EPA's February 21, 2024 UAO and Chiquita is still awaiting feedback from EPA regarding the January 2025 version that Chiquita shared with DTSC. DTSC does not have jurisdiction over the content or timing of revisions to the LMP. Since Chiquita is still awaiting EPA's feedback on the January 2025 version, it is not appropriate for Chiquita to make further updates at this time. For these reasons, it was neither possible nor required that the LMP reflect Tank Farm 13's as-built conditions. Thus, as with the soil compaction documentation, the LMP provided to DTSC cannot serve as the basis for the Notice's allegation that Chiquita failed to comply with the ISE Order.

⁹⁸ *Contra* DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 8 ("Without this information [which Chiquita has already provided], DTSC cannot assess stability of the Cell 8B location.").

⁹⁹ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 8.

¹⁰⁰ *See* Summary of Compaction Test Results at 1 ("Before the work started [on Tank Farm 13] and throughout fill placement, Geo-Logic Associates (GLA) collected soils samples from the borrow area in Cell 7 for compaction testing. The results of these tests are summarized in Table 1 and the test results are included in Attachment 1.").

¹⁰¹ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 8-9.

Accordingly, DTSC's allegations that Chiquita failed to address DTSC's comments regarding the relocation RAW are inaccurate and without merit, and DTSC should withdraw its Notice.

c. Chiquita is dedicated to protecting Cell 8A and complying with all section 5.1.2(c) obligations that do not harm mitigation efforts.

Due to Chiquita's successful mitigation efforts, the ETLF is in a state of localized equilibrium and does not pose an imminent and substantial danger to Cell 8A. Based on its consultants' data driven analysis, Chiquita unequivocally disagrees with DTSC's assessment that the ETLF poses an existential threat to Cell 8A warranting the construction of the requested vertical barrier unprecedented in scope and complexity. Importantly, DTSC has ordered this construction without any scientific analysis demonstrating that the requested vertical barrier would preclude heat intrusion into Cell 8A and without any engineering study demonstrating that the barrier could be constructed. Not only has DTSC failed to present any evidence that the barrier would have a positive effect on protecting Cell 8A, but DTSC fails to consider the myriad of substantial negative impacts that the barrier would create. The construction of the requested vertical barrier would reverse the substantial progress that Chiquita's ongoing mitigation efforts to control the ETLF have accomplished. For these reasons, among others, Chiquita has good cause to not install the vertical barrier requested in section 5.1.2(c) of the ISE Order or include discussion of its installation in the draft barrier RAW.

Despite its opposition to the requested vertical barrier, Chiquita has remained cooperative and submitted a draft barrier RAW which, when combined with other active mitigation measures, will fully protect Cell 8A. Chiquita has satisfied all other barrier requirements under section 5.3 of the ISE Order. As such, since Chiquita's barrier RAW satisfies all requirements of the ISE Order save for those Chiquita has good cause with which not to comply, DTSC should withdraw its Notice. Chiquita remains wholly dedicated to protecting Cell 8A.

i. Cell 8A is not in imminent and substantial danger.

DTSC's claim that the ETLF poses an imminent and substantial danger to Cell 8A—originally made over nine months ago now—is not supported by actual evidence. Chiquita's ongoing mitigation measures have been successful at controlling the impacts of the ETLF and protecting Cell 8A. The reaction has not expanded into Cell 8A nor does the data suggest it will do so. There is no indication that any slope stability problems exist or will develop. Instead, the reaction remains stable, has reached a general equilibrium, and is cooling in some areas.¹⁰² Further, the law is clear:

¹⁰² The most recent Monthly Reaction Committee report concluded that "ETLF conditions are fully contained within the Reaction Area boundary, and have not expanded into a new cell." Monthly Reaction Committee Determination on Reaction Area Boundary Chiquita Canyon Landfill, Dec. 10, 2025, available at https://s3.us-west-1.amazonaws.com/chiquitacanyon.com.bucket/2025/12/2025-12-10-Reaction-Committee-Determination-on-Reaction-Area_Final.pdf. In some instances, temperatures have decreased since April 2024. For example, TP-04 and TP-20's average temperatures at every depth were lower in November 2025 than in April 2025. Compare Chiquita's April 2025 Monthly Report, with Chiquita's November 2025 Monthly Report. See also Declaration of Robert Dick, P.E., B.C.E.E., In the Matter of South Coast Air Quality Management District v. Chiquita Canyon, LLC, Case No. 6177-4, Oct. 22, 2025, ¶¶ 17-20 ("we have noted numerous areas where we are seeing improvements in

there can be no imminent or substantial danger when there is no necessity for action in excess of the actions already taken and those that are currently ongoing.¹⁰³ The requested vertical barrier is therefore not necessary to install.

ii. DTSC’s requested vertical barrier is not supported by scientific analysis, is technically infeasible, and would negatively impact Chiquita’s successful mitigation measures.

DTSC continues to order Chiquita to install a vertical barrier without any scientific evidence indicating the barrier would prevent the expansion of ETLF conditions into Cell 8A, any engineering analysis demonstrating it could be constructed, and any cost benefit analysis that acknowledges the impact its construction would have on the Landfill and surrounding communities. Chiquita has consistently opposed installation of a vertical barrier and has presented scientific evidence that DTSC has not addressed. Chiquita remains committed to protecting Cell 8A, but will not blindly obey an order that lacks scientific and engineering analysis and would undo the substantial progress Chiquita’s successful mitigations measures have accomplished.

A. DTSC’s requested barrier is not supported by scientific evidence and contradicts LEA’s most recent directive.

DTSC has proffered no scientific evidence in support of its requested vertical barrier, and Chiquita has been unable to identify any evidence or research supporting the proposition that the barrier could effectively prevent or preclude heat transfer under ETLF conditions. EPA’s own guidance does not recommend a soil barrier to mitigate ETLF events.¹⁰⁴ Instead, EPA guidance and industry best management practices include heat removal through aggressive extraction of leachate and gas.¹⁰⁵ This is precisely what Chiquita has been doing. DTSC’s requested vertical barrier would both fail to accomplish these critical tasks and interfere with them.

Chiquita has maintained this position—that a vertical barrier would be infeasible to install—for the last 17 months, starting with the Soil Reaction Break/Barrier Plan submitted to EPA on March 27, 2024 and to the LEA on April 12, 2024 pursuant to EPA’s UAO and in response to LEA letters dated November 21, 2023 and April 5, 2024. After discussions with both EPA and the LEA, Chiquita resubmitted the Soil Reaction Break/Barrier Plan on July 8, 2024 to the LEA and November 26, 2024 to EPA. Although the nature of the requested vertical barrier and Chiquita’s proposed mitigation measures have evolved over the course of these submittals and discussions,

ETLF conditions....the landfill gas wellhead temperatures recorded each month demonstrate several subareas within the data-driven boundary that consistently exhibit substantially lower temperatures than other wellheads within this boundary”).

¹⁰³ *Santa Clarita Valley Water Agency v. Whittaker Corp.*, 99 F.4th 458, 476 (9th Cir. 2024) (no imminent and substantial threat where “there has been extensive government oversight,” and the defendant “has engaged in remedial actions” and “installed over two hundred monitoring wells”).

¹⁰⁴ Elevated Temperature Landfill, U.S. Environmental Protection Agency, *available at* <https://www.epa.gov/land-research/elevated-temperature-landfill> (last updated August 14, 2025).

¹⁰⁵ *Id.*

Chiquita's position has never changed—Chiquita would not, and will not, install the vertical barrier as specified by the LEA and DTSC, for the reasons described herein.

More recently, on November 20, 2025, in response to Chiquita's position, the LEA directed Chiquita to "propose alternatives . . . to protect Cell 8A," aside from the vertical barrier.¹⁰⁶ DTSC's continued insistence that Chiquita install the vertical barrier runs contrary to the LEA's own directives and indication that satisfactory alternatives to the barrier may exist.¹⁰⁷

B. DTSC's requested barrier is neither technically nor practically feasible.

Not only is DTSC's requested barrier contrary to the existing science and best practices to mitigate ETLFs, but the requested barrier is also neither technically feasible nor practically possible to construct. According to Chiquita's technical experts, it is not technically possible to construct DTSC's requested barrier. Simply put, there are no existing construction methods that would result in a barrier as described and depicted in the DTSC ISE Order, which requires "excavating a vertical shaft using a three or four-foot auger drill rig," backfilling the shaft "with a soil-bentonite or soil-cement mix," and installing "tangent" shafts and rows of vertical shafts.¹⁰⁸

As explained in Chiquita's November 21, 2025 letter to DTSC, DTSC and CalRecycle have not demonstrated how the requested vertical barrier could be installed in such a manner that it would effectively mitigate the reaction. DTSC and CalRecycle claim that the requested vertical barrier would not need to be installed to the depths that Chiquita outlines in the draft RAW to contain the reaction and indicate that shallow borings would be sufficient.¹⁰⁹ However, because the peak temperatures of the reaction are beneath the liquids level in the waste mass, relatively shallow borings would not prevent the spread of the heat and reaction beneath the borings; deep boreholes and wells would be necessary. Recognizing that the reaction area is within saturated waste and below the liquid level within the waste mass, and therefore deeper boreholes and wells would be required, sonic drilling rigs would be necessary as conventional drill rigs are unable to drill deep into the reaction area without collapsing the borehole. Sonic drill rigs set the casing while drilling to hold the borehole open in order to allow these borings to drill through the liquid. This drilling method would greatly increase the amount of time required to create the requested vertical barrier, as the sonic rigs have a maximum diameter of one foot instead of three feet, requiring a greater number of borings that would need to be up to 250 feet deep. Based on Chiquita's engineers' experiences at other ETLF landfills, each boring could require approximately three days to complete. This dramatically increases the timeline for the installation of the requested vertical barrier by a magnitude of years even if multiple drill rigs were used to complete the project. DTSC

¹⁰⁶ LEA Comments on the Draft Removal Action Workplan (RAW) Chiquita Canyon Landfill (CCL), SWIS No. 19-AA-0052, Nov. 20, 2025.

¹⁰⁷ See LEA Comments on the Draft [Barrier] Removal Action Workplan (RAW) Chiquita Canyon Landfill (CCL), SWIS No. 19-AA-0052, Nov. 20, 2025, provided in Attachment G.

¹⁰⁸ See Stark Memo at 13-14.

¹⁰⁹ See CalRecycle Comments on the Draft Removal Action Plan to Protect Cell 8A from Intrusion of Elevated Temperature Landfill Event, Sep. 12, 2025, Technical Comment #3 ("The CCL's consultant indicates that the cutoff barrier soil borings would need to be more than 200 ft deep, and this is not feasible. This again is confusing, given that the waste at the interface between Cells 6 and 8 is approximately 80 ft deep and is very achievable.")

also provides no explanation of how the boreholes could be drilled tangent to one another. As Chiquita has explained repeatedly, that is simply not possible when drilling into waste.

Even if it were technically possible to build the requested vertical barrier, numerous construction and worker safety issues would result. For example, the requested vertical barrier would require extremely heavy machinery for drilling on slopes, often 2:1 and up to 150 feet in height. Using existing roads or building new benches into the Landfill's slopes would not facilitate drilling platforms because there are no feasible flat areas from which to drill that could support the weight of the heavy machinery required, which could cause landfill instability or equipment collapse. Additionally, the design of the drilled shafts could cause the shafts themselves to act as conduits for landfill gas to reach the surface. Further, substantial additional construction would likely be required to ready the Landfill site for the barrier, which could take years to accomplish and face issues of its own.

C. DTSC's requested barrier would negatively impact Chiquita's existing, successful mitigation measures.

Even if DTSC's requested vertical barrier could be built, its installation would negatively impact the ongoing mitigation measures at the Landfill, setting back substantial progress that has been made. Constructing the barrier could require Chiquita to reduce or cease its extraction of landfill gas—a critical measure to mitigate the reaction—when areas of active construction overlap with the locations of buried pipelines and other infrastructure. Extracting landfill gas removes heat and pressure from the reaction. Reducing the extraction of such gas would have numerous detrimental impacts, including likely leading to an increase in temperature and pressure, and increasing fugitive surface emissions.¹¹⁰ Relatedly, drilling shafts without vacuum applied could cause the shafts to act as conduits for landfill gas to reach the surface, further exacerbating emissions and complicating gas collection. Finally, constructing the barrier could increase oxygen entering the Landfill's waste mass, which could result in dangerous conditions, including subsurface fires, shifts in gas composition and byproducts, and worsening of the ETLF conditions.

Chiquita's concerns are not unfounded. For example, during the push to deploy the initial 15 additional acres of the geomembrane cover in Segments 1, 2, and 3 of the Landfill, Chiquita saw an increase in temperatures measured at certain wells and temperature monitoring probes, as explained to DTSC. These temperatures went back down soon after the LFG extraction wells and dewatering pumps in the active cover deployment areas came back online. Any alternative(s) to the requested vertical barrier explored or implemented must not impede the effectiveness of Chiquita's existing mitigation measures.

¹¹⁰ As Chiquita explained in numerous communications including its November 7 and November 21, 2025 letters to DTSC, Chiquita immediately observed increased temperatures in the Landfill when it had to take crucial landfill gas and heat extraction equipment offline to deploy the geomembrane cover. Any impacts to existing mitigation measures must be avoided.

iii. The draft barrier RAW and other correspondence provide sufficient support for Chiquita's approach to manage the reaction.

Chiquita rejects DTSC's assertion that Chiquita's draft barrier RAW did not meet the requirements of the ISE Order because it "did not propose any new alternative measures to protect the SET event from entering Cell 8A."¹¹¹ Nowhere was Chiquita's draft barrier RAW required to include such alternative measures.

Chiquita's draft barrier RAW submitted on July 2, 2025 did not propose alternatives to DTSC's requested vertical barrier because the direction to provide proposed alternatives was in DTSC's October 15, 2025 comments. The scope of Chiquita's draft barrier RAW was limited to the requirements of section 5.1.2(c) of the ISE Order, which requested a vertical barrier.

As described throughout this response, DTSC engages in a consistent pattern of attempting to expand the ISE Order in ways that are not supported by the language of the order itself. For example, DTSC claims that Chiquita's draft RAW failed because the existing soil barrier "does not extend fully across landfilled areas" but the ISE Order includes no such requirement.¹¹² Further, Chiquita never represented to DTSC that it intended to offer the existing soil barrier as a "substitute for the requirements of Section 5.1.2(c)." The ISE Order does not state that the barrier is the only method to protect Cell 8A nor that Chiquita must necessarily install a new barrier.¹¹³ It is therefore not necessary for the existing soil barrier to meet all of the requirements of the ISE Order alone; rather, when combined with Chiquita's extensive reaction management strategy, the existing soil barrier improves Chiquita's ability to prevent the spread of the reaction.

Further, DTSC's assertion that Chiquita's draft barrier RAW "did not contain a satisfactory CQA report" is inaccurate. As discussed in Chiquita's November 21, 2025 letter to DTSC, the CQA report originally submitted on May 13, 2025 accurately represented Chiquita's existing soil barrier. As Chiquita explained, the CQA report is meant only to summarize the construction activities to install the existing soil barrier, which it accurately did—not whether the existing soil barrier insulates entirely against heat transfer.¹¹⁴ Nevertheless, Chiquita submitted a revised CQA report for the existing soil barrier on January 9, 2026, in response to DTSC's October 15, 2025 comments.

Finally, and most significantly, DTSC's description of its October 15, 2025 comments in the Notice mischaracterizes the requests made therein. Nowhere in DTSC's October 15, 2025 comments did the department state Chiquita's response must include "a revised RAW" or that the response must

¹¹¹ DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 11.

¹¹² DTSC Notice of Proposed Determination of Noncompliance, Dec. 26, 2025, at 9; *see also* Regarding Imminent and Substantial Endangerment Determinization [*sic*] and Order ("Order" – Docket No. HAS-FY24/25-082), Task 10 – Submit Draft Removal Action Workplan for Protection of Cell 8A from Intrusion of SET Event (Site Code 302132), May 19, 2025 at 2 and Review of Draft Removal Action Workplan, Protect Cell 8A from Intrusion of Elevated Temperature Landfill Event, Imminent and Substantial Endangerment Determination and Order (Docket No. HAS-FY24/25-082), Task 10, Protect Cell 8A from Intrusion of Subsurface Elevated Temperature Event (Site Code 302132, Oct. 15, 2025, at 3.

¹¹³ Section 5.1.2(c) of the ISE Order states, "The measures *shall include, but are not limited to*, the installation of a vertical barrier of inert material"

¹¹⁴ Chiquita's Response to DTSC Comments on Draft Removal Action Workplan, Nov. 21, 2025.

“propose three alternatives.” While DTSC’s comments provide for several deliverables, some with specific deadlines, those deliverables did not include the submission of a revised draft RAW or three proposed alternatives. Rather, DTSC’s comments directed Chiquita “to address each of the comments and recommendations provided above, as well as the comments and recommendations in the attached CalRecycle letter, *in a response letter* to the DTSC Project Manager within 15 days of receipt of this comment letter.”¹¹⁵

DTSC’s October 15 comments stated, in relevant part:¹¹⁶

If the Respondents are steadfast against planning for and ultimately building a vertical barrier to protect Cell 8A from the expanding SET event, then *DTSC is willing to discuss alternatives to protecting Cell 8A. DTSC’s consideration of proposed alternatives* does not modify the Respondents’ obligations to comply fully and completely with the ISE Order.

To pursue the “alternatives” option, the Respondents must document the pursuit of an alternatives meeting with DTSC and agree upon a schedule for submitting both a Cell 8A Protection Alternative Workplan and a Slope Stability Workplan, and the Respondents must submit an abbreviated version of a revised RAW that briefly describes the pursuit of an alternatives Workplan.

Chiquita complied with all requests in DTSC’s October 15 Comments. In a November 21 response, Chiquita unequivocally stated its intent to pursue the “alternatives” option:

As such, Chiquita continues to respectfully decline to install the requested vertical barrier and instead *explicitly elects to pursue the “alternatives” option*. Chiquita is in the process of evaluating viable alternatives that will ensure the continued success of the mitigation measures already in place to manage the reaction *while addressing DTSC’s request to propose alternatives that protect Cell 8A*. The proposed alternatives will additionally include the combination of parameters and data points that trigger implementation as well as the approximate implementation timeline. The alternatives selected will depend on actual Landfill conditions and are subject to change. *Chiquita will submit both a Cell 8A Protection Alternative Workplan*

¹¹⁵ Review of Draft Removal Action Workplan, Protect Cell 8A from Intrusion of Elevated Temperature Landfill Event, Imminent and Substantial Endangerment Determination and Order (Docket No. HAS-FY24/25-082), Task 10, Protect Cell 8A from Intrusion of Subsurface Elevated Temperature Event (Site Code 302132, Oct. 15, 2025, at 12. DTSC’s Notice appears to express surprise at the format of Chiquita’s response to the department’s comments, despite directing Chiquita to submit a response letter rather than a revised draft RAW: “Despite receiving a deadline extension, Respondents did not submit a revised RAW, but instead, submitted a letter on November 21, 2025.”

¹¹⁶ Review of Draft Removal Action Workplan, Protect Cell 8A from Intrusion of Elevated Temperature Landfill Event, Imminent and Substantial Endangerment Determination and Order (Docket No. HAS-FY24/25-082), Task 10, Protect Cell 8A from Intrusion of Subsurface Elevated Temperature Event (Site Code 302132, Oct. 15, 2025, at 6.

*and a Slope Stability Workplan and an abbreviated version of a revised draft RAW. All submissions will meet the standard of practice for draft engineering plans and reports to be submitted to the State of California, as is Chiquita's practice.*¹¹⁷

Thus, DTSC's assertion in the Notice that "Respondents' alternatives proposals remain overdue" is inaccurate. Chiquita has complied with every deliverable included in DTSC's October 15, 2025 comments. DTSC's request for an Alternative Workplan, a Slope Stability Workplan, and an abbreviated version of a revised draft RAW cannot be "overdue" if DTSC has not established a deadline. Chiquita provided deadlines for a number of DTSC's requests in its October 15, 2025 comments, including dates Chiquita would provide the requested Slope Stability Workplan and revised CQA report, both of which Chiquita timely provided. DTSC's other requests require meetings to ensure that both Chiquita and DTSC are aligned on DTSC's expectations and Chiquita's capabilities. Chiquita informed DTSC in a series of emails that it was "actively working on" the Alternative Workplan and would provide the department "with a proposed date to provide the Alternative Workplan" but first needed a call "to further clarify and confirm DTSC's expectations," noting that the questions raised in Chiquita's November 21, 2025 letter to DTSC remain outstanding.¹¹⁸ Chiquita has requested a meeting for the end of January 2026, but such a meeting has yet to be scheduled, as DTSC has yet to commit to a date. As such, Chiquita's draft barrier RAW submitted on July 2, 2025, and Chiquita's response to DTSC's October 15, 2025 comments submitted on November 21, 2025, adequately met the requirements of section 5.1.2(c) of the ISE Order.

iv. The draft barrier RAW satisfied all other requirements under the ISE Order.

DTSC additionally asserts that the draft barrier RAW fails to include information on Chiquita's ownership history, a construction air monitoring plan, or a detailed schedule to install a vertical barrier, pursuant to sections subsections (a), (f), and (n) of section 5.3 of the ISE Order, respectively. Chiquita included in the draft barrier RAW its Odor Mitigation Plan (Revision 1.01) in Appendix J, which includes best management practices for mitigating odors that would be used as construction air monitoring requirements and protocol. As explained in the draft barrier RAW, the actions taken to implement the mitigation measures described therein are consistent with this Odor Mitigation Plan, in satisfaction of section 5.3(f). Further, because Chiquita does not intend to construct DTSC's requested vertical barrier, a schedule for such a barrier was not required to be included in the draft barrier RAW. Chiquita is willing to include ownership history information in the next iteration of the draft RAW but notes that DTSC's Notice is the first instance in which the department made such a request.

¹¹⁷ Chiquita's Response to DTSC Comments on Draft Removal Action Workplan, Nov. 21, 2025 (emphasis added).

¹¹⁸ See Emails between K. Logan (DTSC) and P. Ruttan (DTSC), RE: CCL-Task 10 RAW - 11/21 RTC letter, Dec. 19, 2025, Dec. 23, 2025, and Dec. 31, 2025 ("Upon further review of our November 21, 2025 letter and following our discussion with our technical consultants, Chiquita has outstanding questions regarding scope and the currently requested vertical barrier that we would like to discuss. This discussion will directly inform our proposed alternatives.").

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 38 of 39

Chiquita has been cooperative and transparent with its regulators and the public. It has spent tens of millions of dollars to implement state-of-the-art mitigation measures to address the reaction and maintain compliance with the ISE Order and orders from its other regulators. To move forward constructively, Chiquita respectfully requests that DTSC withdraw its Notice, which as described in detail in this letter is based on factual inaccuracies and misunderstandings. Chiquita also requests that after reviewing Chiquita's extensive communications and data productions described in this letter, DTSC identify with specificity any remaining perceived deficiencies with the draft RAWs. Chiquita remains willing, as it has been all along, to engage in a productive dialogue with DTSC to ensure the proper management of the reaction and protection of human health and the environment. Chiquita will endeavor to provide further revisions to the draft RAWs promptly based on a reasonable response timeframe that is commensurate with the scope of the request. Chiquita remains available to confer promptly to align on these issues.

If you have any questions, please do not hesitate to reach out to me at (346) 807-5547 or Kate.Logan@WasteConnections.com.

Sincerely,

Kate Logan

Kate Logan
Senior Remediation Project Manager
Chiquita Canyon Landfill

cc: John Perkey, Chiquita Canyon
Dylan Smith, Chiquita Canyon
Robert Van Hyning, Civil & Environmental Consultants, Inc.
Tim Crick, Department of Toxic Substances Control
Peter Ruttan, Department of Toxic Substances Control
Bridget Floyd, Department of Toxic Substances Control
Diane Barclay, Department of Toxic Substances Control
Christopher Kane, Department of Toxic Substances Control
Johnathon Crook, Department of Toxic Substances Control
Lisa Winebarger, Department of Toxic Substances Control
Katherine Butler, Department of Toxic Substances Control
Craig Scholer, Department of Toxic Substances Control
David Sadwick, Department of Toxic Substances Control
Wes Mindermann, CalRecycle
Todd Thalhamer, CalRecycle

Chiquita Canyon, LLC Response to Notice of Proposed Determination of Noncompliance

January 12, 2026

Page 39 of 39

Todd Sax, California Environmental Protection Agency

Amy Miller, United States Environmental Protection Agency

Laura Friedli, United States Environmental Protection Agency

ATTACHMENT A



Jacob P. Duginski
333 Bush Street, Suite 1500
San Francisco, CA 94104
+1.415.262.4018
JDuginski@bdlaw.com

Megan L. Morgan
Kaitlyn D. Shannon
1900 N Street, NW, Suite 100
Washington, DC 20036
+1.410.230.1343
+202.789.6088
MMorgan@bdlaw.com
KShannon.@bdlaw.com

May 16, 2025

Via E-Mail

Karen Gork
Chief Environmental Health Specialist
Los Angeles County Public Health
Solid Waste Management Program
Local Enforcement Agency
5050 Commerce Drive
Baldwin Park, CA 91706
kgork@ph.lacounty.gov

Zoe Heller
Director
Department of Resources Recycling and Recovery
1001 I Street
Sacramento, CA 95814.
zoe.heller@CalRecycle.ca.gov

**Re: Chiquita's Request for a Formal Appeal Hearing and Petition for Stay of
LEA's May 1, 2025 Compliance Order**

Dear Ms. Gork and Ms. Heller:

Chiquita Canyon, LLC ("Chiquita") received a Compliance Order pertaining to California Code of Regulations, title 27, section 20750 on May 1, 2025 ("LEA Compliance Order"), from the Los Angeles County Department of Public Health, Solid Waste Management Program, acting as the Local Enforcement Agency ("LEA"). The LEA Compliance Order requires Chiquita to undertake four mitigation measures at the Chiquita Canyon Landfill ("Landfill"): (1) installation of an additional approved geomembrane cover; (2) relocation of Tank Farm 9; (3) implementation of a soil barrier; and (4) installation of five additional temperature monitoring probes ("TMPs").

Ms. Gork and Ms. Heller
May 16, 2025
Page 2

Consistent with the procedures of the Public Resources Code (“PRC”) section 44310, Chiquita hereby requests a formal hearing,¹ and provides a statement of issues it seeks to appeal. Specifically, Chiquita appeals the mitigation measures described in Sections 4.1 to 4.4 of the LEA Compliance Order as well as the underlying violations noted in Section 3.0. Chiquita also disputes many of the factual allegations set forth in the Statement of Facts in Section 2.0 of the LEA Compliance Order. Chiquita looks forward to a full presentation of evidence, including expert testimony, at the formal hearing.²

Chiquita also requests a stay of Section 4.3 of the LEA Compliance Order due to the potentially extreme adverse environmental impacts that would result from implementing the LEA Compliance Order during the pendency of the appeal. (See PRC, § 45017(B).) Given the complicated scientific, engineering, and environmental issues (including the exponential increase in odors that would result from implementing the order) outlined in the approximately 1000 pages of attachments, a careful and fully developed record and decision before implementing the LEA Compliance Order is warranted. Because of the complex nature of the issues involved in this case, Chiquita also agrees to waive its right to a hearing within 30 days as provided under PRC section 44310(b). Chiquita will work with the LEA to establish a reasonable briefing schedule and hearing date.

¹ Chiquita objects to the use of informal hearing procedures. Under Government Code section 11445.20(a), informal hearing procedures are appropriate only if there are no disputed issues of material fact. This request establishes that there are many disputed issues of material fact that will require cross examination. While Government Code section 1145.20(b) permits informal proceedings where there is a dispute of material fact, informal proceedings have been confined to cases that involve: (1) monetary amounts of not more than \$1,000 (Gov’t. Code, §11445.20(b)(1)); (2) academic sanctions involving no more than 10 days’ suspension or exclusion (Gov’t. Code, §11445.20(b)(2)); (3) employee disciplinary sanctions that do not involve discharge, demotion, or suspension for more than 5 days (Gov’t. Code, §11445.20(b)(3)); (4) proceedings authorized by agency regulation (Gov’t. Code, §11445.20(c)); or (5) proceedings in which an evidentiary hearing for determination of facts is not required by statute but the agency determines that the federal or state constitution requires a hearing (Gov’t. Code, §11445.20(d)). None of these circumstances exist here. The code provisions governing informal hearings omit proceedings such as the challenge to this Compliance Order that involves many complex, disputed issues of material facts, and millions of dollars in costs. Therefore, the informal hearing procedures are inappropriate to address the issues raised by the Order.

² Nothing in this letter shall be construed to limit the rights, claims, and defenses Chiquita may have against the LEA or any other agency in complying with or challenging this LEA Compliance Order or in any future actions. Chiquita reserves the right to pursue all available state and federal constitutional defenses, including those related to procedural and substantive due process, takings, and equal protection. Chiquita also preserves the right to pursue any defenses available to it under any applicable state or federal statute. Moreover, nothing in this letter shall be construed as an admission of any factual allegation or legal conclusion in the Order or an admission of any liability for any matter described in the Order. Chiquita reserves the right to raise any defense, or any information in support thereof, whether mentioned in this letter or otherwise existing or known to Chiquita on the date of this letter.

I. STATEMENT OF ISSUES

A. Previous, Duplicative, and Contradictory State and Federal Orders Demand Striking Sections 4.1, 4.2, and 4.3.

The LEA Compliance Order conflicts with previously issued state and federal orders, including the U.S. Environmental Protection Agency’s (“EPA”) Unilateral Administrative Order (“UAO”)³ issued on February 21, 2024, and the Department of Toxic Substances Control’s (“DTSC”) Imminent and Substantial Endangerment Determination and Order (“ISE Order”)⁴ issued on April 2, 2025.

Under the Supremacy Clause, state and local laws and orders that “interfere with, or are contrary to the laws of Congress” are preempted and are therefore invalid. (*Fireman’s Fund Ins. Co. v. City of Lodi, California* (9th Cir. 2002) 302 F.3d 928, 943.) Thus, conflict preemption exists wherever the LEA Compliance Order is in opposition to the pre-existing federal UAO. (See e.g., *U.S. v. City and County of Denver, Colo.* (D. Colo. 1996), 916 F. Supp. 1058 [holding that the City’s cease and desist order violated the supremacy clause by being in direct conflict with an EPA order].) Chiquita does not dispute that the Los Angeles County Department of Public Health may exercise authority at the Landfill. Chiquita does object, however, that Chiquita must or even *could* follow the orders of the Los Angeles County Department of Public Health, which is a local agency with delegated state authority, when those orders conflict with those of the federal EPA.

Sections 4.1, 4.2, and 4.3 of the LEA Compliance Order conflict with the “Master Work Plan” requirement of Paragraph 22 in the EPA issued UAO. Under the UAO’s Master Work Plan Requirement, Chiquita must include (1) a “Leachate Management Plan” which controls the operating procedures to store leachate at the Landfill; (2) a “Soil Reaction Break/Barrier Plan” which includes the installation of temperature monitoring devices and specifications of a containment trench; and (3) a “Cover Installation Plan,” requiring the installation of a High-Density Polyethylene geomembrane. The Master Work Plan, and these individual workplans, are all subject to EPA oversight and approval: “[f]ollowing EPA’s approval or modification of the Master Work Plan, Respondent shall implement the Master Work Plan in accordance with the schedule and provisions approved by EPA.”⁵ The Master Work Plan requirements overlap with the requirements of Section 4.1, 4.2, and 4.3 of the LEA Compliance Order. LEA and EPA having approval authority over the same actions is in conflict and interferes with EPA’s federal authority.

³ U.S. Environmental Protection Agency, Unilateral Administrative Order, EPA Docket No. RCRA 7003-09-2024-0001 and CERCLA 106-09-2024-05 (February 21, 2024), provided in Attachment A. Chiquita reserves its right to supplement the record. See Cal. Rules of Court, rule 3.2225.

⁴ Department of Toxic Substances Control, Imminent and Substantial Endangerment Determination and Order, Docket No. HAS-FY24/25-082 (April 2, 2025), provided in Attachment B.

⁵ EPA UAO, at 26.

Although EPA has indicated it is abating “until further notice” the UAO requirements related to the Soil Reaction Break/Barrier Plan, EPA has reiterated it “reserves all rights under Section XXIV of the UAO, CERCLA, or other authorities to require CCL to take measures to address the potential expansion of the reaction, including a soil break/barrier, in the future, thus confirming its preemptive role over the state agencies.”⁶ Chiquita therefore objects to Section 4.1, 4.2, and 4.3 of the LEA Compliance Order as they are preempted by the UAO. (*Fireman’s Fund Ins. Co.*, 302 F.3d at 943.)

Similarly, Sections 4.1, 4.2, and 4.3 directly overlap and conflict with an earlier-issued order from a separate state regulator: the DTSC. On April 2, 2025, DTSC issued an ISE Order to Chiquita. The DTSC Order, issued one month before the LEA Compliance Order, also requires Chiquita to extend the geomembrane cover, relocate Tank Farm 9, and install a barrier to prevent expansion of the reaction to Cell 8A. DTSC also requires that their agency approve the relevant workplans. Chiquita cannot have multiple regulators with independent review and approval authority over the same substantive work. Chiquita therefore objects to the later-issued LEA Compliance Order.

The LEA Compliance Order is directly duplicative and violates state and federal due process by creating a potentially impossible compliance situation and the possibility for double penalties. If the regulators do not agree (and history suggests they won’t) the regulators have created a “Catch-22”—Chiquita will be penalized by the LEA if it complies with a conflicting DTSC workplan, and penalized by DTSC if it complies with a conflicting LEA workplan. This is untenable. (See *Adam v. Jacobs* (2d Cir. 1991) 950 F.2d 89, 93 [holding parties should be “free from the vexation of concurrent litigation over the same subject matter”]; see also *Coleman v. Newsom* (9th Cir. 2025) 131 F.4th 948, 959 [“Inability to comply with an order is ... a complete defense to a charge of contempt.”].)

Even if the agencies do agree, Chiquita will be subject to double penalties for potential violations. This is illegal. (See generally Cal. Penal Code § 654 [“An act or omission that is punishable in different ways by different provisions of law may be punished under either of such provisions, but in no case shall the act or omission be punished under more than one provision”].) The dueling and overlapping orders are particularly egregious when the workplans demand strict timelines for compliance and there is high potential for delay due to forces outside of Chiquita’s control (including engineering challenges in an evolving landfill environment and

⁶ Letter from US EPA to Chiquita re Second Revised Soil Reaction Break/Barrier Plan, dated Apr. 16, 2025, provided in Attachment C. EPA also indicated that it is deferring specifically to DTSC’s ISE Order, although LEA had previously issued a letter requesting the same actions that the DTSC Order required. See, 2025-04-01, Letter from LEA to Chiquita, re “Review of the November 26, 2024, Revised Soil Reaction Break/Barrier Plan for the Chiquita Canyon Landfill Subsurface Elevated Temperature (SET) Event”, provided in Attachment D. This further indicates that between the DTSC and LEA Order, the DTSC Order should control.

Ms. Gork and Ms. Heller
May 16, 2025
Page 5

new supply chain challenges for supplies and equipment).

In addition to due process, basic equities favor striking 4.1, 4.2, and 4.3 of the LEA Compliance Order. DTSC was the first mover. (See generally *Adams v. California Dep't of Health Servs.* (9th Cir. 2007) 487 F.3d 684, 688 [“District Court may exercise its discretion to dismiss a duplicative later-filed action, to stay that action pending resolution of the previously filed action, to enjoin the parties from proceeding with it, or to consolidate both actions”]; see also generally *Hollingsworth v. Superior Ct.* (2019) 37 Cal.App.5th 927 [when tribunals have overlapping jurisdiction, the tribunal first “assuming jurisdiction” retains the matter].) The ISE Order predated the LEA Compliance Order by approximately a month. In that time, Chiquita has been diligently cooperating with DTSC to resolve their concerns. Chiquita has (i) engaged in multiple meetings with DTSC, (ii) submitted a tank farm removal plan, (iii) submitted a construction quality assurance report for the construction of a soil barrier; and (iv) will submit a plan for a cover expansion on May 16. In working with DTSC and complying with its ISE Order, Chiquita is already taking all reasonable steps to comply with the first-issued state order on the exact subject of the LEA Compliance Order. (See generally *Kelly v. Wengler* (9th Cir. 2016) 822 F.3d 1085, 1096 [“A contemnor in violation of a court order may avoid a finding of civil contempt only by showing it took all reasonable steps to comply with the order”].)

Therefore, Chiquita seeks to strike 4.1, 4.2, and 4.3 on preemption, due process, impossibility, substantial compliance, and basic equities grounds.

B. Section 4.3 is Unlawful if the LEA Insists on Additional Barriers.

In addition to the grounds described above, Section 4.3 of the LEA Compliance Order should be stricken because it is arbitrary, capricious, and dangerous.⁷ The barrier will fail to

⁷ As a preliminary matter, Chiquita may already be in compliance with Section 4.3 because of the soil barrier it installed in the summer of 2024. The barrier consists of a five-foot layer of soil across the length of Cell 8A's interface with Cell 6. Importantly, this barrier was installed without disturbing tons of dormant and decaying waste. For this reason, even if the barrier has limited utility in materially slowing the spread of the reaction, there was no danger of the potential extremely negative consequences associated with the construction of the massive barrier contemplated in the Order. Excavating thousands of tons of waste in constructing a new barrier will pose grave risks of nuisance impacts to the surrounding community and the stability of the Landfill, as further outlined in Section B of this letter. See generally 2024-03-27 Soil Reaction Break/Barrier Plan, provided in Attachment E.

In compliance with DTSC's ISE Order, Chiquita has already submitted to DTSC a Construction Quality Assurance report regarding the construction of the installed soil barrier. 2025-05-13 Email from Chiquita to DTSC re “CC: Construction Quality Assurance Report for the Soil Barrier Construction Project (Docket No. HSA-FY24/25-082)”, provided in Attachment F. To the extent the LEA takes issue with the existing soil barrier and seeks to order additional barriers, Chiquita appeals this issue. Chiquita has maintained this position for nine months. See 2024-07-08 Revised Soil Reaction Break/Barrier Plan, provided in Attachment G. For additional background on the barrier requirement, see 2023-11-21, Letter re CalRecycle's Review of Conditions at the Landfill, provided in Attachment H; see also 2023-12-7, Chiquita's Response to November 21, 2023 Letter and Additional Mitigation Measures, provided in Attachment I.

Ms. Gork and Ms. Heller
May 16, 2025
Page 6

counteract the reaction, increase odors, and threaten the stability of the Landfill.⁸ It will increase the risk to the surrounding community of exposure to hazardous substances. Expert evidence and objective data plainly demonstrate these flaws in the barrier and Chiquita will prove this at hearing and in any subsequent judicial review.

The effectiveness of the barrier contemplated by Section 4.3 is unsupported by *any* evidence, much less substantial evidence. Chiquita has been unable to identify any evidence or research supporting the proposition that such a barrier could effectively prevent heat transfer under ETLF conditions. Further, the LEA has not identified such evidence. Importantly, US EPA guidance does not recommend a soil barrier to mitigate ETLFs.⁹ Rather US EPA guidance and industry best management practices include heat removal through aggressive extraction of gas and leachate. The proposed barrier fails to accomplish these essential tasks.¹⁰

Any barrier of the type ordered in the LEA Compliance Order (beyond what Chiquita has already installed) would also pose significant health and safety concerns to personnel at the Landfill and members of the surrounding community. Installation of a vertical barrier would significantly increase foul odors by *exposing thousands of tons of decomposing waste* to the environment. The barrier's construction would seriously diminish the stability of the landfill. Moreover, installing the barrier would necessarily require shutting off the gas collection system and, in some instances, disconnecting gas wells altogether. If Chiquita takes such action, the effectiveness of the gas collection system would severely diminish, resulting in increased emissions. Quite clearly, such a barrier would undermine the progress Chiquita has made—by all objective scientific measurements of the site this year, off-site air quality has shown marked

⁸ See 2024-11-26, Chiquita Canyon Landfill's Revised Soil Reaction Break/Barrier Plan, at 19, provided in Attachment J.

⁹ [Elevated Temperature Landfill, U.S. Environmental Protection Agency \(last updated September 4, 2024\)](#).

¹⁰ See 2024-09-24, LEA Response to Chiquita's Revised Soil Reaction Break Barrier Plan, provided in Attachment K; 2024-11-26, Chiquita's Response to LEA's September 24, 2024 Letter re Revised Soil Reaction Break/Barrier Plan, provided in Attachment L; See LEA Response to Chiquita's Revised SRBBP; see also Email Correspondence between Chiquita and the LEA re Request for Information, provided in Attachment M (the original attachments to the email correspondence include voluminous data and are incorporated by reference, and will be provided upon request).

Prior to this Order, the agencies had directed Chiquita to evaluate a shallow barrier consisting of a soil trench. To the extent the agencies consider a shallow barrier appropriate here, the published literature pertaining to ETLFs and landfill reactions shows that in ETLFs, heat accumulates in deeper zones of the waste mass. CCL is not aware of any documented instances of an ETLF in the United States experiencing a subsurface exothermic chemical reaction exclusively at a shallow depth of less than 50 feet. And here, the waste zone exhibiting the highest recorded temperatures at the landfill is much deeper. Accordingly, a shallow barrier would prove ineffective in addressing potential expansion of a reaction, rendering the requirement arbitrary, capricious, and otherwise not in accordance with law.

improvement coupled with a decrease in odor complaints from the surrounding community—while providing no benefit to mitigating the reaction.¹¹

The barrier lacks any evidentiary support and is arbitrary and capricious. Further, installing such a barrier will significantly harm the surrounding community. Accordingly, Chiquita seeks to strike Section 4.3 of the LEA Compliance Order and stay the effectiveness of this Section during the appeal (see section II *infra*).¹²

C. The Deadlines Imposed By Sections 4.1, 4.2, and 4.4 Are Arbitrary and Capricious.

1) Installation of the Cover (4.1)

The LEA Compliance Order requires Chiquita to provide by June 2, 2025 a workplan for a significant expansion of a previously installed geosynthetic cover.¹³ Chiquita previously installed a 30-mil High Density Polyethylene geosynthetic cover over approximately 44.6 acres of the reaction area pursuant to the LEA’s June 6, 2024 Compliance Order and South Coast AQMD’s Stipulated Order for Abatement. Chiquita finished installation of the geosynthetic cover in accordance with the LEA’s June 6, 2024 Compliance Order on December 27, 2024. Chiquita also completed installation of an additional approximately 1.3 acres of geosynthetic cover over the west toe drain excavation project’s disposal area on January 3, 2025.¹⁴

As noted in correspondence with DTSC on this issue, Chiquita had already committed to expand the geosynthetic cover. Consistent with DTSC’s requirements, Chiquita has now submitted a work plan to DTSC for a phased expansion of the cover.¹⁵ The LEA Compliance Order sets an impossible and arbitrary and capricious deadline of June 2, just two weeks from today, to submit a second highly complicated work plan to a second state agency, this time for as much as 100 acres of expansion. The LEA also demands approval authority and a clear schedule of deadlines, both of which are impossible to provide. Installing a new cover will be a time intensive process, with significant room for uncertainty.¹⁶ For each section of geosynthetic cover,

¹¹ See [Chiquita’s February 2025 Technical Addendum to the December 2024 State of the Landfill Report](#).

¹² In the meantime, Chiquita will provide the LEA courtesy copies of correspondence it shares with DTSC on this issue.

¹³ LEA Compliance Order, Section 4.1.

¹⁴ See Final Completion Report of Milestone 2A-1 (Formerly Mitigation Measure #2A), Chiquita Canyon Landfill, Castaic, California, provided as Attachment N. The LEA, in collaboration with CalRecycle, conditionally approved the Final Compliance Report on April 9, 2025, contingent on Chiquita submitting an Operations and Maintenance Plan, which Chiquita submitted to the LEA on May 9, 2025, provided in Attachment O.

¹⁵ Chiquita submitted the draft geosynthetic cover expansion workplan to DTSC on May 16, 2025. See 2025-05-02 Email from Chiquita to DTSC re “Chiquita Canyon Landfill – Order, Docket No. HAS-FY24/25 – 092, Monthly Summary Report”, Provided in Attachment P.

¹⁶ Chiquita also notes that the LEA Compliance Order is not consistent on the scope of the ordered cover. Paragraph 2.9 says the cover needs to be installed over approximately 100 acres of the Landfill, whereas paragraph 4.1 broadly

Chiquita must undertake myriad measures, including: removal of green waste and vegetation in the area; regrading to maintain positive drainage; installation of surface landfill gas collectors; disconnecting and temporarily relocating portions of the landfill gas collection system, then reconnecting and installing the same after installation; installation of geomembrane pipe boots; and installation of a sandbag ballast system.¹⁷ Previously, Chiquita had to devote more than a year to the completion of these projects and the schedule changed numerous times because of the substantial steps involved in the installation process as well as site conditions and unforeseen circumstances.

Given growing supply chain and uncertainties with respect to procuring the materials for the cover and related equipment, and the complicated nature of cover expansion as outlined above, the accelerated LEA Compliance Order timeline for submission is arbitrary and capricious. As such, the Section should be stricken.

2) Relocation of the Tank Farm (4.2)

The LEA Compliance Order requires relocation of Tank Farm 9 with a workplan submitted to the LEA for review and approval by June 2, 2025. Chiquita agrees that Tank Farm 9 should be relocated from its present location and has undertaken diligent efforts to plan an effective and safe relocation since July 2024, as Chiquita's regulators have been made aware, including the LEA.¹⁸ In December 2024, Chiquita began construction for such relocation efforts. However, as established by the attached correspondence,¹⁹ multiple agencies ordered Chiquita to cease preparation activities in Canyon B for the relocation of the tank farm. Since that time, these agencies have not provided clear directives on permitting or approvals regarding technical requirements of the new installation, preventing Chiquita from taking the same action demanded by this Order.

Chiquita has already submitted a new plan for tank farm relocation consistent with the ISE Order.²⁰ Again, the LEA Compliance Order sets an arbitrary and capricious deadline of June 2, just two weeks from today, to submit a second highly complicated work plan to a second state agency which is also demanding approval authority. The Section is unlawful and should be stricken.

says, "over all areas of the Site that are not currently covered by a geomembrane and to which the reaction area has expanded or has the potential to expand".

¹⁷ See Completion Report, at Attachment 5.

¹⁸ See 2024-07-19 Email Correspondence to LA County Fire, provided in Attachment Q.

¹⁹ See Compilation of Email Correspondence between Chiquita and LA County Fire and EPA re Tank Farm Relocation, provided in Attachment R.

²⁰ See 2025-05-09 Email from Chiquita to DTSC re "CCL: Draft RAW for Interim Relocation and Stabilization of Containerized Waste (Docket No. HSA-FY24/25-082)", provided in Attachment S.

3) Installation of Temperature Monitoring Probes (TMPs) (4.4)

Chiquita is making all reasonable efforts to comply with the requirement to install five new TMPs, but the current deadline of August 4 is unreasonable. Chiquita is already working diligently to acquire the necessary parts, but the delivery of these custom order parts is complicated by current trade disputes that have caused manufacturing and shipping delays across the world. The LEA's schedule for installing the five TMPs and providing the final completion report by August 4, 2025 is tight and does not account for delays caused by, for example, weather, site conditions, and unanticipated events like supply chain disruption. There is also the potential during the drilling process for bore holes to collapse inward due to the presence of liquids saturating the waste, preventing drilling to the full planned depth, as occurred multiple times during Chiquita's installation of the second set of TMPs.²¹ Chiquita will remain in close contact with its regulators regarding this issue but objects to the timeline in the LEA Compliance Order. The deadline for installation is unreasonable, arbitrary and capricious, and should be stricken.

II. A Stay Is Appropriate Due to the Likelihood of Serious Adverse Environmental Affects That Would Result with Section 4.3 Compliance.

A stay is warranted when “the immediate effect of the order ... will preclude or interfere with the provision of an essential public service so that the public health and safety or the environment will be adversely affected.” PRC § 45017(B). A stay requires “extraordinary circumstances.” *Id.* Such circumstances are met here.

Although the Landfill no longer accepts waste, the Landfill's maintenance and upkeep and efforts to manage the reaction are an essential public service. Chiquita Canyon Landfill served Los Angeles County for 54 years and was accepting an average of approximately 200,000 tons of waste per month in the years prior to closure. The Landfill was a critical component of Southern California's solid waste infrastructure, taking in nearly a quarter of Los Angeles County's waste from millions of residents and businesses annually. At the time of closure, it was the second-largest landfill in the County. The LEA Compliance Order threatens vital response and maintenance activities at the Landfill. Now that it is experiencing a rare ETLF event, it is essential to public health and safety that the Landfill's mitigation efforts are not hamstrung.

The installation of a barrier, for the reasons outlined above,²² would be adverse to the health and safety of the surrounding community, and threatens significant environmental issues. To start, Chiquita's ongoing mitigation efforts at the Landfill have been largely effective.²³ No

²¹ See 2024-12-24 Letter from Chiquita to LEA, “Notification Regarding Change in Proposed Locations of TMPs Identified in Revised Soil Reaction Break/Barrier Plan”, provided in Attachment T.

²² See Section I(B), *supra* and Attachments.

²³ See [Chiquita's February 2025 Technical Addendum to the December 2024 State of the Landfill Report](#).

Ms. Gork and Ms. Heller
May 16, 2025
Page 10

hazardous materials have entered the watershed and fugitive emissions and any resulting odors have vastly decreased. The ordered barrier will unravel this progress and pose grave risks.

The barrier would force the excavation and movement of tens of thousands of tons of decaying waste. Uncovering this amount of buried waste would cause significant odors, disrupt the landfill's stability, and create the potential for the release of characteristically hazardous leachate to waterways. To Chiquita's knowledge, no barrier like the one ordered by Section 4.3 has ever been installed in any landfill anywhere. With good reason: digging up tens of thousands of tons of decaying waste and exposing it to the atmosphere would cause severe nuisance conditions and other significant environmental issues, with no evidence that it would achieve the intended goal. The proposed installation of the barrier is technically unfeasible, lacking any engineering basis, and it will seriously harm the surrounding community. In short, nearly all progress at the Landfill will be undone by the construction of a barrier such as that required by the LEA Compliance Order.

These are exactly the type of "extraordinary circumstances" that warrant a stay. The creation of a barrier would devastate the surrounding communities. In addition to the arguments above, we look forward to presenting detailed technical and scientific arguments during a formal hearing.

II. CONCLUSION

Chiquita has been working diligently to mitigate the ETLF event and address its associated impacts. The LEA should consider Chiquita's efforts and Chiquita's continued cooperation with the LEA, and all its regulators, as we work to resolve this unprecedented reaction event.

If the LEA intends to proceed, Chiquita appeals the LEA Compliance Order, which is unlawful on all grounds set forth above, as well as the underlying factual determinations leading to the Order. Chiquita further requests a stay of Section 4.3 due to the severe adverse environmental impact that would result from opening up the landfill, dislodging, and exposing tens of thousands of tons of waste.

Sincerely,

/s/ Megan Morgan

Megan Morgan
Kaitlyn Shannon
Jacob P. Duginski
Counsel for Chiquita Canyon, LLC

Ms. Gork and Ms. Heller
May 16, 2025
Page 11

Enclosures: Exhibits A through T

cc:

Ken Habaradas, Los Angeles County LEA
Eric Morofuji, Los Angeles County LEA
Liza Frias, Los Angeles County LEA
Shikari Nakagawa-Ota, Los Angeles County LEA
Renee Jensen, LEA Counsel
Wes Mindermann, CalRecycle
Todd Thalhamer, CalRecycle
Emel Wadhwani, CalRecycle
Mark DeBie, CalRecycle
Joel Jones, United States Environmental Protection Agency
Joshua Wirtschafter, United States Environmental Protection Agency
Laura Friedli, United States Environmental Protection Agency
Tyler Holybee, United States Environmental Protection Agency
Mark Anthony Relon, United States Environmental Protection Agency
Kaoru Morimoto, United States Environmental Protection Agency
Roshni Brahmhatt, United States Environmental Protection Agency
Rick Sakow, United States Environmental Protection Agency
Tara Frost, United States Environmental Protection Agency
Yana Garcia, California Environmental Protection Agency
Linda Lye, California Environmental Protection Agency
Todd Sax, California Environmental Protection Agency
Dan Ziarkowski, Department of Toxic Substances Control
Peter Ruttan, Department of Toxic Substances Control
Tim Crick, Department of Toxic Substances Control
Thanne Berg, Department of Toxic Substances Control
Diane Barclay, Department of Toxic Substances Control
Christopher Kane, Department of Toxic Substances Control
Johnathon Crook, Department of Toxic Substances Control
Lisa Winebarger, Department of Toxic Substances Control
Jeff Linberg, California Air Recourses Board
Jack Cheng, South Coast Air Quality Management District
Larry Israel, South Coast Air Quality Management District
Wayne Nastri, South Coast Air Quality Management District
Terrence Mann, South Coast Air Quality Management District
Enrique Casas, Los Angeles Regional Water Quality Control Board
Susana Arredondo, Los Angeles Regional Water Quality Control Board
Jenny Newman, Los Angeles Regional Water Quality Control Board
Robert Ragland, Los Angeles County Department of Public Health

Liza Frias, Los Angeles County Department of Public Health
Nichole Quick, M.D., Los Angeles County Department of Public Health
Shikari Nakagawa-Ota, Los Angeles County Department of Public Health
Barbara Ferrer, Los Angeles County Department of Public Health
Muntu Davis, Los Angeles County Department of Public Health
Dusan Pavlovic, County Counsel
Caroline Castillo, County Counsel
Blaine McPhillips, County Counsel
Emiko Thompson, Los Angeles County Public Works
Mark Pestrella, Los Angeles County Public Works
Miki Esposito, Los Angeles County Public Works
Karlo Manalo, Los Angeles County Public Works
David Nguyen, Los Angeles County Public Works
Alex Garcia, Los Angeles County Department of Regional Planning
Phillip Chen, Los Angeles County Department of Regional Planning
Steven Jareb, Los Angeles County Department of Regional Planning
Amy Bodek, Los Angeles County Department of Regional Planning
Ai-Viet Huynh, Los Angeles County Department of Regional Planning
Teresa Quiaoit, Los Angeles County Fire
Daniel Yniguez, Los Angeles County Fire

ATTACHMENT B



REGION 9

SAN FRANCISCO, CA 94105

April 16, 2025

Mr. Steve Cassulo
District Manager
Chiquita Canyon, LLC
29201 Henry Mayo Drive
Castaic, CA 91384-2705

RE: Second Revised Soil Reaction Break/Barrier Plan

Dear Manager Cassulo:

On March 27, 2024, the U.S. Environmental Protection Agency ("EPA") received the Soil Reaction Break/Barrier Plan (the "Plan"), submitted as Attachment C to the Master Work Plan submitted by Chiquita Canyon, LLC ("CCL") pursuant to the Unilateral Administrative Order, EPA Docket No. RCRA 7003-09-2024-0001 and CERCLA 106-09-2024-05, *In the Matter of Chiquita Canyon, LLC*, issued February 21, 2024 (the "UAO"). On May 10, 2024, EPA provided a Notice of Deficiency to the Plan. On July 8, 2024, EPA received a revised copy of the Plan. On October 1, 2024, EPA provided a Second Notice of Deficiency to the Plan. On November 26, 2024, EPA received a letter from CCL to EPA regarding the resubmission of the Plan and a revised copy of the Plan (the "Second Revised Plan").

EPA has received a copy of the letter, dated April 1, 2025 (the "Third Rejection Letter"), from the Los Angeles County Department of Public Health, Solid Waste Management Program, acting as the Los Angeles County Local Enforcement Agency ("LEA") to CCL, pursuant to which the LEA provided an initial response to the Second Revised Plan. The Third Rejection Letter indicates that the LEA is preparing an official Notice and Order, which will formally establish compliance deadlines for directives to be determined by the LEA, which may include: (a) expansion of the containment and cover system; (b) relocation of leachate Tank Farm 9; (c) prevention of expansion of the reaction into Cell 8A; and (d) installation of additional temperature monitoring probes.

EPA has also received a copy of the Imminent and Substantial Endangerment Determination and Order, Docket No. HAS-FY24/25-082, *In the Matter of: Chiquita Canyon Landfill*, issued on April 1, 2025, by the California Department of Toxic Substances Control (the "ISE Order"). The ISE Order directs CCL, Chiquita Canyon, Inc., and Waste Connections US, Inc., to prepare and implement workplans for activities consistent with those outlined in the LEA's Third Rejection Letter.

Through these actions, the State of California has demonstrated it is leading efforts to address the potential expansion of the landfill reaction. EPA believes that these actions may overlap or supersede the requirements of the UAO for CCL to prepare and implement a Soil Reaction Break/Barrier Plan.

EPA, therefore, is exercising its discretion to abate until further notice the requirements under Paragraph 22(c)(2) of the UAO. EPA anticipates that successful completion of the requirements in the ISE Order may ultimately resolve or render moot further obligations under Paragraph 22(c)(2) of the UAO. Absent further notice, any obligations of CCL under the UAO conditioned upon approval of the Master Work Plan (as defined in the UAO), including but not limited to, the obligations under Paragraphs 23, 26 (Progress Reports), and 27 (Final Reports) of the UAO, shall not be conditioned upon approval of the Soil Reaction Break/Barrier Plan (as defined in the UAO).

EPA reserves all rights under Section XXIV of the UAO, CERCLA, or other authorities to require CCL to take measures to address the potential expansion of the reaction, including a soil break/barrier, in the future.

If you have any questions or comments regarding this letter, please contact Laura Friedli, EPA Attorney Advisor, at (415) 972-3325 or Friedli.Laura@epa.gov.

Sincerely,

Tyler Holybee
EPA Project Coordinator

Enclosures

cc: John Perkey, Waste Connections
Jim Little, Waste Connections
Kurt Shaner, Waste Connections
Sarah Phillips, Waste Connections
Megan Morgan, Beverage & Diamond
Nicole Weinstein, Beverage & Diamond
Allyn Stern, Beverage & Diamond
Joel Jones, United States Environmental Protection Agency
Roshni Brahmhatt, United States Environmental Protection Agency
Kaoru Morimoto, United States Environmental Protection Agency
Rick Sakow, United States Environmental Protection Agency
Mark Anthony Relon, United States Environmental Protection Agency
Joshua Wirtschafter, United States Environmental Protection Agency
Laura Friedli, United States Environmental Protection Agency

ATTACHMENT C



December 15, 2025

Via E-Mail

Eric Morofuji, EHS III
Los Angeles County Department of Public Health
Solid Waste Management Program
Local Enforcement Agency
Environmental Programs Division
5050 Commerce Drive,
Baldwin Park, California 91706
emorofuji@ph.lacounty.gov

Re: Chiquita Canyon, LLC Response to LEA's Comments on the Revised Draft Removal Action Workplan: Extension of Covered Area – LEA Compliance Order, May 1, 2025

Dear Mr. Morofuji:

Chiquita Canyon LLC (Chiquita) submits this response to the Local Enforcement Agency's (LEA) November 20, 2025 letter providing comments on Chiquita's revised draft Removal Action Workplan (RAW) for Extension of Covered Area, resubmitted on October 3, 2025, pursuant to section 4.1 of the LEA's Compliance Order issued on May 1, 2025, and Chiquita's response letters dated August 15, 2025 and August 18, 2025.

The revised draft RAW detailed Chiquita's plan to expand the area of the Chiquita Canyon Landfill (the Landfill) covered by 30-mil high density polyethylene (HDPE) geomembrane in accordance with the requirements of the United States Environmental Protection Agency's (EPA) Unilateral Administrative Order (UAO) issued on February 21, 2024, the South Coast Air Quality Management District's (SCAQMD) Stipulated Order for Abatement (SOFA) issued on November 13, 2024, and most recently modified on December 10, 2025, and the LEA's Compliance Order issued on June 6, 2024. This cover expansion will also supplement the area of the Landfill covered by 40-mil HDPE geomembrane in accordance with the west toe drain workplan. The revised draft RAW detailed Chiquita's process of installing additional geomembrane cover that is at least 60-mil thick, made from HDPE with an inner core of ethylene vinyl alcohol (EVOH) barrier resin, tan in color, and textured on both sides.

The LEA's November 20, 2025 letter directs Chiquita to install the approved geomembrane cover "over the entire facility where waste is disposed (Main Canyon waste management area)" by

August 31, 2026, to continue to install the approved cover during the winter months, and to provide an estimated cover installation schedule by December 15, 2025.

Chiquita disputes the LEA's rationale for requiring cover over the Main Canyon by August 31, 2026. Such an aggressive installation schedule is infeasible to safely and effectively deploy the remainder of the geomembrane cover, and covering the entire Main Canyon is an unnecessary and surprising change from the portion of the Landfill that Chiquita originally discussed covering. Pursuant to DTSC's Imminent and Substantial Endangerment Determination and Order (Order) and subsequent communications with EPA and the LEA, Chiquita had discussed covering 100 acres of the Landfill with geomembrane cover. These 100 acres do not include covering the tank farms or other areas, which Chiquita does not intend to cover now. Not only has the LEA moved the goal posts by unilaterally requiring the deployment of more geomembrane cover than previously agreed, but it has also imposed a deployment schedule that does not consider the multitude of complexities and pitfalls about which Chiquita has informed its regulators on several occasions. For the reasons described herein, in Chiquita's letters to EPA dated August 15, 2025 and to the Department of Toxic Substances Control (DTSC) dated November 7, 2025 and November 21, 2025,¹ and during our discussion with the LEA on December 10, 2025, Chiquita intends to act in a way that is most protective of the existing mitigation measures and continue to move forward with the installation of the geomembrane cover in accordance with the draft Master Schedule submitted to DTSC on November 21, 2025 and attached to this letter as **Attachment A**.²

Due to the unique and complex nature of the work needed to deploy the geomembrane cover while minimizing impacts to Chiquita's other ongoing reaction mitigation efforts and the impending rainy season, Chiquita cannot at this time commit to a further expedited and detailed schedule or to covering the entire Main Canyon. Chiquita's draft Master Schedule reflects an expeditious deployment timeline that accounts for the challenging realities, complicated logistics, and unknown variables, such as weather, that are beyond Chiquita's control and can impact the pace of such an extensive installation project.³

As the LEA is aware, under DTSC's Order and per directives from DTSC, EPA, and the LEA, Chiquita worked as expeditiously as possible to deploy the initial 15 additional acres of the geomembrane cover in Segments 1, 2, and 3 of the Landfill before the rainy season.⁴ As described in prior correspondence, during this initial deployment process, Chiquita had to take landfill gas extraction wells and dewatering pumps in the active cover deployment areas offline to complete the cover installation. To help ensure the longevity of the installed geomembrane cover, the cover must be placed on a smooth surface. This surface must also be graded for appropriate routing of stormwater. Because of ongoing settlement in the data-driven reaction area, installation of cover across this initial 15 acres included substantial subgrade preparation, requiring use of heavy equipment to complete this subgrade preparation quickly enough before the rainy season. To protect existing infrastructure from damage during this subgrade preparation phase, existing piping

¹ Chiquita expressly incorporates these letters herein.

² The draft Master Schedule is approximate and subject to change based on actual conditions at the Landfill, as further described in Chiquita's November 21, 2025 response to DTSC's comments on the draft RAW.

³ Chiquita Canyon, LLC Response to DTSC Request for Updated Cover Deployment Schedule, Nov. 7, 2025, page 2.

⁴ *Id.*

and infrastructure was removed, to the extent feasible, requiring removal of portions of the piping to enable cover installation access.⁵

As a result of taking landfill gas extraction wells and dewatering pumps offline in the active cover deployment areas, Chiquita saw an increase in on-site odors and temperatures.⁶ This complicated Chiquita's deployment strategy. Continuing to deploy the remainder of the geomembrane cover using this same approach could negatively impact the success of the mitigation measures in place to manage the reaction and mitigate odors. These impacts to the existing mitigation measures also raise questions about the practicality of installing geomembrane cover over the entire "Main Canyon waste management area," as installing just a portion of the additional coverage has disrupted the existing mitigation measures and the progress Chiquita has made to manage the reaction.

Chiquita will not compromise on ensuring that the reaction continues to be effectively managed for the sake of accelerating the geomembrane cover deployment rate. An unreasonably aggressive and strict cover deployment schedule that also requires covering unnecessary portions of the Landfill would limit Chiquita's ability to continue to evaluate the effectiveness and feasibility of its deployment strategy and to make optimizing adjustments as needed.⁷ Such an aggressive and strict schedule could hamper effective reaction management by increasing landfill gas extraction well and dewatering pump downtime, as described in Chiquita's November 7, 2025 response to DTSC, not to mention that the LEA has not explained why covering the entire Main Canyon is necessary.⁸

To continue to deploy additional geomembrane cover as quickly, safely, and effectively as possible while maintaining Chiquita's existing mitigation measures, Chiquita has begun employing a new deployment process that enables landfill gas extraction wells and dewatering pumps in active cover deployment areas to be offline for the least amount of time possible, typically one to two days at a time.⁹ As further described in prior correspondence, this new deployment process has been successful thus far, but Chiquita requires more time to fully evaluate the feasibility of this process, to optimize this process to ensure maximum operational efficiency for the remainder of the installation project, and to determine the estimated amount of time needed to complete deployment using this new process.¹⁰ Each well, lateral, header, forcemain, electrical line, and panel located in the active cover deployment area, which is constantly changing as the active cover deployment area moves, must be managed uniquely. For example, while some pieces of the system may be relatively straightforward to take offline, others may pose particular challenges due to their apparent location and the area(s) of the Landfill they service, among other factors.¹¹ In these more

⁵ *Id.*

⁶ *Id.*

⁷ *Id.* at 3.

⁸ *Id.*

⁹ *Id.* at 2.

¹⁰ *Id.* at 2-3.

¹¹ *See id.*

complicated situations, the equipment cannot be disconnected from the system, requiring piping to be lifted so that cover may be placed underneath while maintaining connection to the system.¹²

This is extremely tedious and delicate work to ensure that the equipment and infrastructure are not damaged. Even in relatively straightforward situations that allow for equipment to be taken offline, Chiquita must coordinate efforts and schedules with at least five different groups of people to disconnect the equipment in order to move the cover deployment process forward.¹³ As a point of reference, some of Chiquita's infrastructure in these areas are gas headers that are 24 inches in diameter. These headers require heavy machinery to lift, which cannot be driven directly on top of already-deployed liner, causing access issues.

Nevertheless, and despite this unavoidable reality, Chiquita's draft Master Schedule submitted to DTSC and the LEA on November 20, 2025, attempts to estimate completion dates of each phase of deployment, subject to actual conditions at the Landfill and a multitude of moving parts and competing projects, any of which could impact the installation of the geomembrane cover.¹⁴ As an example, Chiquita requested and received an extension of the original acreage deployment schedule to allow the main access road on the north side of the Landfill to remain open while other roads to the south were completed, as well as to maintain access for a drill rig to complete installation of certain temperature monitoring probes; this demonstrates the nature of the competing projects Chiquita must balance.

Deploying the geomembrane cover expeditiously is not a matter of maximizing the number of drill rigs and liner crews that can fit onsite to complete the work all at the same time; rather, it is a matter of working deliberately and meticulously to not disrupt the gas infrastructure and other existing mitigation measures, as having to perform repairs on the gas infrastructure and other existing mitigation measures themselves would require Chiquita to pause deployment. To maintain the integrity of the gas infrastructure and existing mitigation measures, Chiquita must deploy the geomembrane cover at a careful and diligent rate while still working as expeditiously as possible to avoid delays in the first place. Chiquita cannot commit to completing the installation of the geomembrane cover "over the entire facility where waste is disposed (Main Canyon waste management area)" by August 31, 2026 for the reasons described herein and in Chiquita's August 15, November 7, and November 21, 2025 responses. Chiquita instead estimates completion of additional cover by July 31, 2027, in accordance with the draft Master Schedule submitted to DTSC and the LEA on November 21, 2025.¹⁵

¹² *Id.*

¹³ *Id.*

¹⁴ For example, Chiquita recently drilled new temperature monitoring probes (TMPs) and installed thermocouples in each. These TMPs are in the same area in which the additional geomembrane cover has been or will be deployed. This necessitated pausing the cover deployment process until installation of the thermocouples in each TMP was complete. This is but one of several constantly competing projects that Chiquita must balance with the deployment of the geomembrane cover on a daily basis. Having an additional crew would not have helped because the installation of the thermocouples in the TMPs could not have been completed while the additional geomembrane cover was being deployed in the same area. *See also* Chiquita Canyon, LLC Response to DTSC Comments on Draft RAW, November 21, 2025, PDF page 33.

¹⁵ *Id.*

The LEA's letter additionally requests that Chiquita "[e]mploy the necessary resources to complete geomembrane coverage" and "[c]ontinue to install the required geomembrane cover during the winter months to ensure completion within the required timeframe, as CCL has done previously."

Since the start of the deployment of geomembrane cover, Chiquita has employed all necessary resources to work as expeditiously and safely as possible to install the geomembrane cover despite several regulatory roadblocks. As soon as DTSC ordered Chiquita on April 2, 2025 to install the geomembrane cover pursuant to DTSC's Order, Chiquita immediately began to diligently identify and source materials for the geomembrane cover and prepare a feasible construction schedule. Chiquita provided DTSC on April 22, 2025 copies of a fact sheet of the geomembrane cover material it was evaluating at that time and a case study of the geomembrane cover material's success at another landfill. Chiquita then shared its plans with DTSC to order the geomembrane cover materials once DTSC provided its written approval. Yet, such written approval did not come until June 2, 2025 due to in large part discussions between DTSC and CalRecycle relating to the color of the geomembrane cover. Given this regulatory delay, Chiquita conferred with DTSC to come up with a prioritization plan for the deployment of the geomembrane cover. Chiquita and DTSC together agreed to prioritize a 300-foot radius or approximately 15 acres of the Landfill extending from the existing 30-mil geomembrane covered area before deploying geomembrane cover over other areas of the Landfill. This plan required Chiquita to move quickly to complete the installation before the rainy season.¹⁶

From the start, and as detailed in Chiquita's previous correspondence and its monthly summary reports to DTSC, Chiquita has employed all necessary resources to deploy the geomembrane cover despite regulatory setbacks. These regulatory setbacks prevented Chiquita from moving forward with the deployment of the geomembrane cover in earnest until shortly before the start of the rainy season. Chiquita has nevertheless continued to employ all necessary resources to deploy the geomembrane cover, but this process cannot again jeopardize the Landfill's existing mitigation measures.

As described in prior correspondence, Chiquita has committed to deploying EVOH in the existing 30-mil HDPE cover area to enhance odor mitigation. Employing additional crews to deploy the geomembrane cover would not lead to a more expeditious geomembrane cover deployment rate; in fact, employing additional crews could result in occupational hazards and health and safety issues and would complicate the efficacy of the geomembrane cover deployment process and further jeopardize the other mitigation measures in place. CalRecycle's letter to the LEA, dated October 3, 2025, states, "Currently, the CCL is using only one drill rig and one liner crew; the CCL should employ the necessary resources to complete the entire waste area within the recommended timeframe." To the extent that CalRecycle or the LEA intend to insinuate that Chiquita is not making as much progress as it can due to its use of one drill rig and one liner crew, Chiquita strongly disputes this allegation. More drill rigs and liner crews do not equate to more progress.

¹⁶ Chiquita is still dealing with the repercussions of rushing to deploy the initial 15 acres of geomembrane cover before the start of the rainy season, including delays associated with deploying the final portion of geomembrane cover over Segment 3 and bringing impacted equipment back online due to the weather. See, e.g., weekly update to the LEA, Chiquita Canyon Landfill – Geosynthetic Cover – Mitigation Measure 4.1, Nov. 14, 2025; Nov. 21, 2025; Nov. 26, 2025; Dec. 5, 2025; and Dec. 12, 2025.

As described above, the work required to deploy the geomembrane cover is tedious and delicate. This is not an issue of sequencing the work like an assembly line; the pieces must fit together precisely, like a puzzle. Having more drill rigs or liner crews onsite would not expedite the deployment process, even if the liner crews were working on different jobs. To safely deploy the geomembrane cover without disrupting, or worse, breaking the existing gas infrastructure requires deliberate and meticulous work that additional hands would prevent.

Additionally, the work that must be done to deploy the geomembrane cover is highly specialized. Any crew hired to complete the work must be properly trained, as the gas infrastructure that must be moved or rerouted to accommodate deployment of the cover poses potential hazards and must be handled by crews who know how to do so safely. Finding and training knowledgeable crews is not simple, yet Chiquita has managed to add three crews to assist with the deployment of the cover in the past few months, and the contractor has brought on an additional supervisor to further assist with the deployment and train these crews.

Moreover, some portions of the Landfill have a significant amount of infrastructure that must be relocated before deployment of the geomembrane cover can occur in those areas. This infrastructure includes but is not limited to a thermal oxidizer, pump cleaning and repair equipment, and contractor trailers and offices. As the LEA is aware, Chiquita is actively working to relocate this infrastructure, but this relocation is not a simple or fast process, especially because the Landfill has limited space. Chiquita has nevertheless been diligently working to relocate this infrastructure to allow for the deployment of geomembrane cover in these areas of the Landfill.

During the winter months, also known as the rainy season, the Landfill experiences rain and other wet weather conditions that make it unsafe for personnel to access the site or operate the requisite equipment to install the geomembrane cover. Requiring Chiquita to continue deployment of the geomembrane cover regardless of weather conditions would unnecessarily endanger human health and safety and could constitute a violation of labor and occupational safety laws. Rain creates accessibility issues for heavy machinery, and to the extent that gas or liquids extraction equipment were offline, they would have to remain offline until the ground surface dried up enough to again allow machinery safe access to the area. This would further hamper Chiquita's ongoing mitigation efforts.

CalRecycle's letter to the LEA, dated October 3, 2025, states, "The CCL has previously demonstrated its ability to install a geomembrane liner during the winter months, and it should continue this approach."¹⁷ Chiquita's ability to make progress on that 30-mil geomembrane cover during the previous rainy season has no bearing on Chiquita's ability to make progress on the deployment of the new geomembrane cover this rainy season. The Landfill today is engaged in even more mitigation measures to manage the reaction than during the previous rainy season when the 30-mil geomembrane cover was installed. For instance, and as shown in Chiquita's State of the

¹⁷ The rate of previous cover deployment does not dictate present cover deployment possibilities. Chiquita previously installed approximately 45.9 acres of 30-mil cover over the course of about seven months, with completion in January 2025. It appears the LEA assumed Chiquita could continue working at the same rate and provided an August 31, 2026 deadline. However, every cover project is different and must take into account present day conditions and changes to the Landfill.

Chiquita Canyon, LLC Response to LEA Comments on Revised Draft RAW

December 15, 2025

Page 7 of 8

Landfill Report, the 30-mil deployment was initially begun in the furthest northwest corner of the Landfill, on side slopes where minimal existing infrastructure was present. The pictures in the State of the Landfill Report document progress during early 2024, which is the rainy season presumed to be referenced by CalRecycle.

As the LEA should be aware, Landfill infrastructure has changed substantially since that time. In conjunction with and upon completion of the 30-mil cover, Chiquita deployed many large gas headers to greatly expand its ability to collect and control landfill gas. As documented in the State of the Landfill Report, Chiquita added 50 miles of piping in 2024 alone, a majority of which is now in the areas being scheduled for further geomembrane deployment. Chiquita must now work around this additional infrastructure, which will slow down its ability to install further geomembrane.

Nevertheless, when the Landfill experiences a dry period long enough to allow personnel to safely access the site and operate the requisite equipment to install the geomembrane cover during the rainy season, Chiquita has been working to complete the enhancements of the existing 30-mil cover during these discrete periods. The gas infrastructure is less likely to be negatively impacted in these areas if extended pauses are needed due to the weather. Chiquita will continue to provide weekly updates on the cover installation progress to the LEA pursuant to Milestone 4.1 of the LEA's Compliance Order, including noting delays caused by the rainy season and other weather conditions.

Chiquita has detailed its geomembrane installation progress in a variety of reports, including the aforementioned weekly updates to the LEA. Chiquita also provides monthly updates to DTSC that describe in detail Chiquita's efforts since May 2025 to commence this undertaking. Consistent with our discussion with the LEA on December 10, 2025, Chiquita intends to continue to employ all necessary resources to complete the installation of the geomembrane cover by July 31, 2027, per the draft Master Schedule and subject to actual Landfill conditions.

Further deployment of the geomembrane cover to the areas that would enhance odor mitigation is of the utmost importance to Chiquita. However, the geomembrane installation process must support the continued effective management of the reaction by allowing for the unimpeded and continued extraction of heat, gas, and liquids as maximally as possible. The LEA's requested completion date of August 31, 2026 and unilateral decision that the geomembrane cover be installed over the entire Main Canyon would severely curb the progress that Chiquita has made to manage and stabilize the reaction and possibly endanger human health and safety. As such, Chiquita cannot in good conscious agree to such an infeasible request.

If you have any questions, please do not hesitate to reach out to me at (346) 807-5547 or Kate.Logan@WasteConnections.com.

Chiquita Canyon, LLC Response to LEA Comments on Revised Draft RAW

December 15, 2025

Page 8 of 8

Sincerely,

Kate Logan

Kate Logan
Senior Remediation Project Manager
Chiquita Canyon Landfill

cc: Robert Ragland, Los Angeles County Department of Public Health
Liza Frias, Los Angeles County Department of Public Health
Azar Kattan, J.D., M.P.H., Los Angeles County Department of Public Health
Ken Habaradas, Los Angeles County LEA
Karen Gork, Los Angeles County LEA
Renee Jensen, LEA Counsel
Blaine McPhillips, Senior Deputy County Counsel
Emiko Thompson, Los Angeles County Department of Public Works
Alex Garcia, Los Angeles County Department of Regional Planning
Ai-Viet Huynh, Los Angeles County Department of Regional Planning
Wes Mindermann, CalRecycle
Todd Thalhamer, CalRecycle
Rachel Beck, CalRecycle
Janelle Heinzler, CalRecycle
Jeff Lindbert, California Air Resources Board
Jack Cheng, South Coast Air Quality Management District
Larry Israel, South Coast Air Quality Management District
Enrique Casas, Los Angeles Regional Water Quality Control Board
Amy Miller, United States Environmental Protection Agency
Joel Jones, United States Environmental Protection Agency
Thanne Berg, Department of Toxic Substances Control
Peter Ruttan, Department of Toxic Substances Control
Tim Crick, Department of Toxic Substances Control
Christopher Kane, Department of Toxic Substances Control
Johnathon Crook, Department of Toxic Substances Control
Lisa Winebarger, Department of Toxic Substances Control
Bridget Floyd, Department of Toxic Substances Control
John Perkey, Chiquita Canyon
Dylan Smith, Chiquita Canyon

ATTACHMENT A

Draft Master Schedule

The Department of Toxic Substances Control's (DTSC) October 15, 2025 letter directed Chiquita Canyon, LLC (Chiquita) to submit a draft Master Schedule.¹ Chiquita provides the requested draft Master Schedule below, which is subject to change based on actual conditions at the Chiquita Canyon Landfill (the Landfill). This draft Master Schedule focuses on the scope of DTSC's Order, including the tasks scheduled for completion pursuant to the three Removal Action Workplans (RAWs) required by the Order as well as DTSC's data requests issued pursuant to section 6.11 of the Order.

Geomembrane Cover Deployment (60-mil EVOH/HDPE)

The following primary tasks are currently being executed as part of the cover deployment process; however, as deployment continues, it is possible that efficiencies will be established that may result in changes to the timing of tasks needed to complete deployment of the geomembrane.

1. Disconnect wellheads and piping
2. Relocate gas header piping
3. Prepare subgrade
4. Deploy liner
5. Construct Access Road
6. Reconnect gas header and wells
7. Install LFG boots

As previously stated in Chiquita's November 7, 2025 response to DTSC's request for an updated cover deployment schedule, which Chiquita incorporates herein, several factors will continue to impact deployment progress, including but not limited to weather conditions through the rainy season, technical challenges, and the need to coordinate with multiple contractors, personnel, and competing and concurrent projects. Until the rainy season concludes, it is difficult to accurately project how cover deployment will progress. All dates below are approximate and subject to weather conditions.

- Deployment Schedule
 - Segments 1 and 2 – Completed September 2025
 - Segment 3 (partial) – Completed November 2025
 - Segment 3 (remaining 1.7 acres) – December 12, 2025

¹ DTSC General Comment #1 ("The future submittal of the Draft RAW must include a Master Schedule of all activities planned for the landfill and a draft of the Master Schedule must be submitted to DTSC within seven (7) days for review. This Schedule shall also include timing of all responses to data requests."). Chiquita requested an extension to submit this draft Master Schedule as part of this response to DTSC's October 15, 2025 letter.

- Install 16 acres of 60-mil EVOH geomembrane over the top of the existing 30-mil geomembrane cover, which involves disconnecting and reconnecting gas headers and wells, as needed, over the geomembrane cover – March 31, 2026
- Segments 4 through 15 – November 30, 2026
- Segments 16 through 20 – July 31, 2027 (subject to weather conditions)
- Communication and Notification Schedule for Deployment Progress
 - Provide regular updates to DTSC through:
 - Weekly technical calls (Tuesdays)
 - Written weekly updates (Fridays)
 - Bi-weekly updates regarding estimated upcoming project timelines (every other Friday)

Interim Relocation and Stabilization of Containerized Waste (Tank Farm 9)

As of November 21, 2025, Tank Farm 9 has been relocated to Cell 8B. The last primary task associated with this RAW is to obtain a grading permit from Los Angeles County Public Works (Public Works).

- Permitting Schedule
 - Submitted grading permit application – August 4, 2025
 - Received comments on grading permit application from Public Works – September 25, 2025
 - Submitted notification for Conditional Authorization of hazardous waste treatment in Tank Farm 13 to the CUPA – November 20, 2025
 - Respond to Public Works’ comments on grading permit application
 - Obtain grading permit – To be determined by Public Works

Protection of Cell 8A From Intrusion of ETLF (Existing Mitigation Measures and Proposed Alternatives)

As of November 21, 2025, Chiquita has elected to consider alternatives to the requested vertical barrier in the Order. Because these alternatives have not yet been selected or finalized, Chiquita reserves the right to supplement the below schedule with additional tasks associated with the selected and finalized alternatives. The schedule below includes primary tasks associated with Chiquita’s existing mitigation measures.

- Existing Mitigation Measures Schedule
 - Gas Well Drilling
 - Landfill gas vertical extraction well drilling will continue.
 - There are 15 additional wells to be drilled in the Tank Farm 7 area that were previously inaccessible. The drilling has already started, and there are 3 wells that have yet to be drilled.

- Borehole logs are submitted to the South Coast Air Quality Management District (South Coast AQMD) in a monthly report pursuant to Condition 8 of the Stipulated Order for Abatement in Case No. 6177-4 (“SOFA”) (see Chiquita’s Odor Mitigation website (<https://chiquitacanyon.com/odor-mitigation/>) under Odor Maintenance Logs (“Stipulated Order Condition 8 (monthly reports)”)).
- Weekly well drilling updates for the drilling of landfill gas vertical extraction wells and temperature monitoring probes are submitted to South Coast AQMD pursuant to SOFA Condition 15(c) (see Chiquita’s Odor Mitigation website under Odor Maintenance Logs (“Stipulated Order Condition 15(c) (weekly well drilling updates)”)).
- Rig parts that allow for deeper drilling have been installed and the rig is now capable of drilling wells up to 195 feet in depth, subject to on-site conditions.
- Sonic Drill Rig – TMPs and SVEs
 - The sonic drill rig finished drilling TMP-36 to TMP-40 on September 24, 2025. Chiquita ordered temperature sensors and remote telemetry heads for the drilled TMPs (TMP-36 to TMP-40). The vendor was delayed in shipment. Chiquita expects to receive the equipment by November 24, 2025, and once they arrive, Chiquita expects to install them by December 5, 2025, subject to weather conditions. The thermocouples had to be ordered after drilling was completed because the Local Enforcement Agency (LEA) directed Chiquita to use an equation that depends on the final installed TMP depth to ensure equal spacing among the thermocouples.
 - The mobilization of the drill rig and widening of the existing perimeter road to allow drill rig access required more time than initially anticipated to begin the installation of soil vapor extraction (SVE) wells. The installation of SVE well SW-3S/M was completed on October 23, 2025, and SW-3D on October 27, 2025.
 - Drilling of the remaining temperature probes (TMP-22, TMP-23, and TMP-33) is being conducted concurrently to expedite the projects to the extent feasible.
 - The sonic drill rig was redirected to complete the installation of TMP-23, while the road work continued for the SVE wells.
 - As TMP-23 was being completed, Chiquita prepared the west side road for the drilling of the SVE wells.
 - Over the upcoming weeks, the sonic drill rig will move between the SVE wells and TMPs to complete both projects.
 - TMP-23 was completed on October 22, 2025, and TMP-22 was completed on October 31, 2025.

- Due to the current and expected rain conditions on-site, the west side road is currently inaccessible. We anticipate drilling will resume on December 1, 2025, after the Thanksgiving holiday.
 - Chiquita and the LEA held a meeting on October 17, 2025, and determined where TMP-33 should be located. This location has been staked out and the additional work required to allow the drill rig to access this location has been completed.
 - Please also see the weekly well drilling updates for the drilling of landfill gas vertical extraction wells and temperature probes submitted to South Coast AQMD pursuant to SOFA Condition 15(c) (see Chiquita's Odor Mitigation website under Odor Maintenance Logs ("Stipulated Order Condition 15(c) (weekly well drilling updates)").
 - See the weekly TMP reports submitted to the LEA pursuant to [the LEA's June 6, 2024 Compliance Order](#) and to the US EPA (see Chiquita's Odor Mitigation website under Reports, Permits, and Other Documents, LEA ("Weekly submittals of all temperature monitoring probe data in accordance with Milestone 1B"))).
- Flares/TOxs
- The HERO thermal oxidizer (TOx) is now online, and the work to relocate the Parnel TOx has been completed. All three TOx are currently running.
 - The ongoing discussion with South Coast AQMD has resulted in Chiquita modifying the permit applications for the 3 gas destruction units to be classified as flares, with verbal agreement from South Coast AQMD staff on September 24, 2025, supporting the ongoing operation of the 3 units until Flares 4 and 5 are online. Chiquita submitted an application for a permit to construct/operate and a Title V permit modification for Flare 4 to South Coast AQMD on October 30, 2023. This flare will provide additional critical destruction capacity once installed. Under the current SOFA, Chiquita would need to take down Flare 1 once Flare 4 is permitted and operational.
 - Chiquita is working through problems with the Los Angeles County Electronic Permitting & Inspections (EPIC LA) system regarding the review and approval of grading permits for Flare 4.

Data Requests (Order Section 6.11)

As of November 21, 2025, Chiquita has provided DTSC with access to data pursuant to Order section 6.11 on the following dates. Several of these documents were previously submitted to DTSC and other regulators.

- Soil compaction results for the soil placed in Cell 8B – May 7, 2025
- Follow up summary of soil compaction results – June 3, 2025

- AutoCAD files for the January 2023 topographic map and subgrade map – June 12, 2025
- Surface and base elevations for TMP-21 through TMP-35 – July 2025
- Proposed data delivery schedule pursuant to Order section 6.11 – July 21, 2025
- Raw gas data collected for the Landfill from August 20, 2024 to August 20, 2025 – August 25, 2025
- Topography of the surface of the Landfill in AutoCAD format for August 2025, ground survey points to fix the 2025 topography and properly orient the AutoCAD data, and boring logs for TMP-01 through TMP-21 and TMP-24 through TMP-35 – September 8, 2025
- EVOH Construction Quality Assurance documents – September 25, 2025
- Spreadsheet with latitudes and longitudes for a specific list of wells – October 14, 2025
- Data Management Plan – October 21, 2025 (originally submitted to US EPA and the RMAC in July 2024)
- Raw data via SCS eTools – October 30, 2025
- Raw data via RMC – November 3, 2025

ATTACHMENT D



BARBARA FERRER, Ph.D., M.P.H., M.Ed.
Director

MUNTU DAVIS, M.D., M.P.H.
County Health Officer

ANISH P. MAHAJAN, M.D., M.S., M.P.H.
Chief Deputy Director

AZAR KATTAN, J.D., M.P.H.
Deputy Director for Health Protection

LIZA FRIAS, REHS
Director of Environmental Health

SCOTT ABBOTT, REHS, M.P.A.
Assistant Director of Environmental Health

5050 Commerce Drive
Baldwin Park, California 91706
TEL (626) 430-5374 • FAX (626) 813-3000

www.publichealth.lacounty.gov/eh/



BOARD OF SUPERVISORS

Hilda L. Solis
First District

Holly J. Mitchell
Second District

Lindsey P. Horvath
Third District

Janice Hahn
Fourth District

Kathryn Barger
Fifth District

November 20, 2025

Via Electronic Correspondence

Mr. Steve Cassulo, District Manager
Steven.cassulo@wasteconnections.com
Chiquita Canyon Landfill
29201 Henry Mayo Drive
Castaic, CA 91384

SUBJECT: LEA COMMENTS ON THE RESPONSE LETTERS AND THE DRAFT REMOVAL ACTION WORKPLAN TO ADDRESS THE EXTENSION OF COVERED AREA SUBMITTED BY CHIQUITA CANYON LANDFILL (CCL), SWIS NO. 19-AA-0052

Dear Mr. Cassulo,

The Los Angeles County Department of Public Health, Solid Waste Management Program, acting as the Local Enforcement Agency (LEA), is responding the following three (3) submittals received from Chiquita Canyon Landfill's (CCL) addressing the LEA's May 1, 2025, Compliance Order (Order), Section 4.1:

- ***“CCL’s Response to U.S. EPA’s, DTSC’s, and the LEA’s Requirement to Expand the Geomembrane Cover,”*** dated August 15, 2025. This letter served as CCL’s response to the U.S. Environmental Protection Agency’s (EPA) July 24, 2025 letter titled *“Additional Work required under UAO for Geomembrane Cover Expansion.”* The submittal also addressed the Department of Toxic Substances Control (DTSC) April 1, 2025 Imminent and Substantial Endangerment Order, and the LEA’s May 1, 2025 Compliance Order requiring expansion of the geomembrane cover.

- ***“Response to LEA Comments on the DRAFT RAW: Extension of Covered Area, for May 1, 2025 Compliance Order Mitigation Measure 4.1,”*** dated August 18, 2025. This letter served as CCL’s response to the LEA’s August 1, 2025 comment letter on the *“Draft Removal Action Workplan (Draft RAW): Extension of Covered Area,”* dated May 2025, prepared by Civil and Environmental Consultants, Inc. (CEC).
- ***“Revised Draft Removal Action Workplan (Revised RAW): Extension of Covered Area,”*** dated October 2025. This document, prepared by CEC, was submitted to address Section 4.1 of the LEA’s Order.

CCL’s response letters and the Draft RAW propose to install additional geomembrane cover in five-acre segments, which CCL asserts would effectively control emissions while minimizing disturbance to the landfill gas control system. CCL further proposed to discontinue the installation during the rainy season and instead, conduct repairs to the existing geomembrane cover. CCL’s estimated installation schedule did not have a completion date and is described as “To Be Determined,” allowing for adjustments based on field conditions and unforeseen delays.

The LEA, in consultation with the California Department of Resources Recycling and Recovery (CalRecycle), has determined these submittals are unacceptable. Furthermore, since CCL has failed to install a vertical soil barrier and the reaction continues to expand, the LEA’s current directive is for CCL to install the approved geomembrane cover over all areas to which the reaction has expanded or has the potential to expand as stated in Section 4.1 of LEA’s Order. The entire facility where waste is disposed (Main Canyon waste management area) shall be covered by August 31, 2026. As part of compliance with Section 4.1, CCL must also:

1. By December 15, 2025, provide an estimated schedule for the 60 ml geomembrane cover installation, with final completion of no later than August 31, 2026.
2. Employ the necessary resources to complete geomembrane coverage over the entire facility where waste is disposed (Main Canyon waste management area) by August 31, 2026.
3. Continue to install the required geomembrane cover during the winter months to ensure completion within the required timeframe, as CCL has done previously.

The LEA reserves the right to issue a new directive or order if site conditions or available data indicate that additional corrective actions are necessary to protect public health and the environment.

Ensure to obtain all permits and approvals from Federal, State and Local agencies as required by the law and regulations.

Mr. Steve Cassulo
November 20, 2025
Page 3 of 3

If you have any questions, please email me at emorofuji@ph.lacounty.gov or call me at (213) 668-2206.

Sincerely,



Eric Morofuji, EHS III
Solid Waste Management Program
Local Enforcement Agency (LEA)

Enclosed: CalRecycle comment letter for Directive 4.1 – Expansion of the Geomembrane Cover Schedule dated October 3, 2025.

Cc: (Via Electronic Correspondence Only)

- Robert Ragland, Los Angeles County Department of Public Health
- Liza Frias, Los Angeles County Department of Public Health
- Azar Kattan, J.D., M.P.H, Los Angeles County Department of Public Health
- Ken Habaradas, Los Angeles County LEA
- Karen Gork, Los Angeles County LEA
- Renee Jensen, LEA Counsel (rjensen@bgsplaw.com)
- Blaine McPhillips, Senior Deputy County Counsel
- Emiko Thompson, Los Angeles County Department of Public Works
- Alex Garcia, Los Angeles County Department of Regional Planning
- Ai-Viet Huynh, Los Angeles County Department of Regional Planning
- Wes Mindermann, CalRecycle (wes.mindermann@calrecycle.ca.gov)
- Todd Thalhamer, CalRecycle (todd.thalhamer@calrecycle.ca.gov)
- Rachel Beck, CalRecycle (rachel.beck@calrecycle.ca.gov)
- Janelle Heinzler, CalRecycle (janelle.heinzler@calrecycle.ca.gov)
- Jeff Lindberg California Air Recourses Board (jeff.lindberg@arb.ca.gov)
- Jack Cheng, South Coast Air Quality Management Board (jcheng@aqmd.gov)
- Larry Israel, South Coast Air Quality Management Board (lisrael@aqmd.gov)
- Enrique Casas, Los Angeles Regional Water Quality Control Board (enrique.casas@waterbaords.ca.gov)
- Amy Miller, United States Environmental Protection Agency (Miller.Amy@epa.gov)
- Joel Jones, United States Environmental Protection Agency (Jones.Joel@epa.gov)
- Peter Ruttan, Department of Toxic Substances Control (Peter.Ruttan@dtsc.ca.gov)



October 3, 2025

Via Email: kgork@ph.lacounty.gov

Karen Gork
Chief Environmental Health Specialist
Los Angeles County Department of Public Health
5050 Commerce Drive
Baldwin Park, California 91706

**Subject: Chiquita Canyon Landfill (19-AA-0052) Technical Review – Directive 4.1,
Expansion of the Geomembrane Cover Schedule and Directive 4.2
Relocation of Tank Farm 9 at Chiquita Canyon Landfill**

Dear Ms. Gork:

CalRecycle staff is providing this letter in response to your request for technical assistance in the proposed schedule for the additional geomembrane cover and relocation of Tank Farm 9.

The following comments are provided to the Los Angeles County Department of Public Health [Local Enforcement Agency (LEA)] as assistance to support the program in carrying out its responsibilities at permitted disposal sites. The final determination as to the comments to be provided to the responsible party is within the sole purview of the LEA, acting within the parameters of its discretion, in accordance with its vested authority under its certification as defined in Title 14, California Code of Regulations (14 CCR), Division 7, 27 CCR, Division 2, Subdivision 1 (Section 20005 et seq.), and Division 30 of the Public Resources Code.

Directive 4.1 Comments

CalRecycle staff have reviewed the proposed Chiquita Canyon Landfill (CCL) Proposed Cover Installation and Repair Plan for Directive 4.1 and find it inadequate. Since CCL has chosen not to install any barriers in the main fill, the Subsurface Elevated Temperature (SET) Event has the potential to expand to the entire waste area. CCL's current strategy of using an unproven heat exchange and pressure control methodology is not preventing the SET from expanding or controlling the emissions and/or odors at the facility. According to the South Coast Air Quality Management District, the facility has received over 4,600 complaints and 80 Notices of Violation since January 1, 2025. The SET Event continues to expand and impact the community.

CalRecycle staff recommends that the LEA consider requiring the entire Main Canyon Fill waste management unit to be covered by July 1, 2026. The CCL has previously demonstrated its ability to install a geomembrane liner during the winter months, and it should continue this approach. Currently, the CCL is using only one drill rig and one liner crew; the CCL should employ the necessary resources to complete the entire waste area within the recommended timeframe.

Directive 4.2 Comments

The CCL relocated the hazardous waste treatment and leachate storage facility, known as Tank Farm 9, from the top deck to the bottom of the facility at Cell 8B. CalRecycle staff have provided comments for consideration to the Department of Toxic Substances Control (DTSC) regarding this temporary location. CalRecycle staff consider the current location temporary and susceptible to being affected by the current and future SET Events, which may require relocating the facility again. CalRecycle staff recommends that the LEA consider requiring the CCL to take the necessary actions as soon as practicable to establish a permanent location for the leachate treatment facility (Tank Farm 13) that will not be impacted by the current and future SET Events.

If you have comments or questions, please call (916) 341-6356 or email Todd.Thalhamer@Calrecycle.ca.gov.

Sincerely,



Todd Thalhamer, P.E.
Senior Waste Management Engineer
Engineering Support Branch

Cc Via Email:

Peter Ruttan, Department of Toxic Substances Control (Peter.Ruttan@dtsc.ca.gov)
Todd Sax, CalEPA (Todd.Sax@calepa.ca.gov)

ATTACHMENT E



REGION 9

SAN FRANCISCO, CA 94105

July 24, 2025

Mr. Steve Cassulo
District Manager
Chiquita Canyon, LLC
29201 Henry Mayo Drive
Castaic, CA 91384-2705

RE: Additional Work required under UAO for Geomembrane Cover Expansion

Dear Steve Cassulo:

This letter directs Chiquita Canyon LLC ("CCL") to implement additional work under Paragraph 90 of the Unilateral Administrative Order, EPA Docket No. RCRA 7003-09-2024-0001 and CERCLA 106-09-2024-05, In the Matter of Chiquita Canyon, LLC, issued February 21, 2024 (the "UAO"), the U.S. Environmental Protection Agency ("EPA"). Paragraph 90 allows EPA to direct additional work consistent with the objectives of the UAO.

The overall objectives of the UAO are set forth in Paragraph 1 of the UAO as the performance of response actions to address off-site impacts and ongoing subsurface reactions causing off-site impacts, in connection with the Chiquita Canyon Landfill ("Landfill") in Castaic, California, including identifying, investigating, remediating, and/or preventing the potential endangerment to human health or the environment from activities involving solid and hazardous waste. The objectives of the UAO specifically include the objectives of the Master Work Plan (as defined in the UAO) set forth in Paragraph 22 of the UAO as:

(1) remedy[ing] and prevent[ing] off-Site impacts caused by odors, emissions, leachate or other waste streams; and

(2) deploy[ing] measures to delineate, fully characterize, prevent the expansion of, contain, and reduce the smoldering or the subsurface reaction occurring at the Landfill.

A. Additional Work

EPA has determined that the following additional work ("Additional Work") is necessary to meet the foregoing objectives:

1. CCL shall install an EPA-approved landfill cover on all areas of the Landfill which are not presently covered by a geomembrane and to which the reaction area has expanded or has the

potential to expand. The Additional Work shall be consistent with the California's Department of Toxic Substances Control ("DTSC's") Imminent and Substantial Endangerment Determination and Order, Docket No. HAS-FY24/25-082, dated April 1, 2025 ("DTSC ISE Order") and the Los Angeles County Department of Public Health, Solid Waste Management Program, acting as the Local Enforcement Agency ("LEA") Compliance Order, dated May 1, 2025 ("LEA Compliance Order").¹ Consistent with the LEA Compliance Order, the additional geomembrane cover must be installed over at least 100 acres outside the existing geomembrane cover. In no event shall installation of the cover be conditioned upon findings of the Reaction Committee.²

B. Basis for Determination

EPA has determined, based on temperature monitoring data showing the migration of the reaction at the Landfill, findings regarding the potential for the reaction to expand to the entire main canyon of the Landfill, and the continued issuance of notices of violation based on odor complaints from community members, as described below, that the Additional Work is necessary to meet the objectives of the UAO.

State and local agencies have found, based on extensive analysis of temperature monitoring data, that the reaction has migrated beyond the portion of the Landfill currently covered with geomembrane cover. DTSC determined that "[u]nderground temperatures recorded at [the Landfill] between January 9, 2025 and February 19, 2025 demonstrate the SET event has expanded beyond the original 30 acres in the northwestern portion of the landfill in Cell 1/2A, Module 2B/3, Module 4, and Module 2B/3/4 P2," and, as of April 1, 2025, encompassed "approximately 90 acres of [the Landfill]." See **Enclosure A** at pp. 5-6. Similarly, the LEA concluded that the reaction was continuing to expand as of May 1, 2025: "Contrary to CCL's stated belief that the reaction has not expanded, new temperature data from the recently installed TMPs . . . indicates that the reaction is expanding." See **Enclosure B** at p. 5. These statements were consistent with the findings of Dr. Timothy Stark, a leading landfill expert, based on a review of Waste Borehole Maximum Temperature Profiles Over 6 Weeks from January 9, 2025 to

¹ The DTSC ISE Order and the LEA Compliance Order contain specific requirements for the work to expand the geomembrane cover and for the geomembrane cover, which are hereby incorporated by reference. These requirements include, without limitation: "The geomembrane cover shall accommodate landfill settlement/subsidence, sufficiently limit the transmission of gases (e.g. methane permeance less than 2.5×10^{-13} m/s using ASTM D1434), and provide durability from foot traffic, exposure to ultraviolet radiation, and inclement weather, or motorized equipment, if any. In addition, the cover shall have material properties to address site-specific conditions, including but not limited to, elevated landfill temperatures, settlement, and harmful landfill gas/odor emissions. This work shall be conducted with appropriate air monitoring, use Construction Quality Assurance techniques, and be consistent with South Coast AQMD's order and other applicable requirements. The geomembrane thickness shall be adequate to withstand the activities and conditions at the facility, but no less thick than 40 mil, with material consistent to prevent heat degradation and control odors and emissions as documented in the Stark Memo, Exhibit 6," and "Install a 40- to 60-mil thick tan or green HDPE-EVOH textured geomembrane underlain by a minimum 6 oz/sy nonwoven geotextile over approximately 100 acres outside the existing geomembrane cover. This new barrier must be welded to the existing 30-mil-thick white HDPE geomembrane or placed in a suitable anchor trench. A construction and quality assurance/quality control (QA/QC) plan must be submitted for approval." See **Enclosure A** at pp. 11-12; **Enclosure B** at p. 2.)

² The Reaction Committee was formed in response to the South Coast Air Quality Management District ("SCAQMD") Stipulated Order of Abatement (Case No. 6177-4) to review applicable data, estimate the extent of the reaction, and determine the reaction area. The findings of the Reaction Committee have been disputed by regulatory agencies, such as CalRecycle, which has asserted that the "Reaction Committee has taken a conservative approach in determining the reaction area," disregarding critical data such as carbon monoxide results. See **Enclosure C** at pp. 6-7.

February 19, 2025, that CCL's contractor "believes the SET Event covers about 28 acres as of February 20, 2025 whereas [Dr. Stark's] extent of the SET Event covers about 90 acres." See **Enclosure A**, Exhibit 6 at p. 6. Analysis of temperature monitoring probe data demonstrates that the reaction has migrated beyond the area of the Landfill covered with geomembrane cover.

Further, various statements of state and local agencies, based on analyses of temperature monitoring and other data, confirm that the reaction at the Landfill has the potential to expand to the entire main canyon of the Landfill. On March 28, 2025, CalRecycle issued a letter ("CalRecycle Letter") to the LEA stating, "The reaction area is expanding, and the current containment strategy has failed." See **Enclosure C**, CalRecycle Letter at pp. 18-19. CalRecycle based its conclusion on an analysis of various reaction metrics, including temperature, landfill gas levels, settlement, cover fissures, leachate outbreaks, damage to the Landfill's gas collection and control system, and emissions and odors, among other metrics. See **Enclosure C**, CalRecycle Letter at p. 5. Similarly, DTSC found that, "Without additional action, the SET event may consume the entire waste fill in the Main Canyon, which could threaten the stability of the southern toe of the waste fill in Cell 8A." See **Enclosure A** at p. 6.

The potential for the reaction to affect the entire main canyon of the Landfill warrants expansion of the geomembrane cover over the remaining uncovered portion of the Landfill. Indeed, Dr. Stark has confirmed that given the lack of containment strategy for the reaction, that "the only option for controlling odors and emissions is to cover the area with a geomembrane . . . over which the temperature monitoring probes (TPs) have been installed." See **Enclosure A** at Exhibit 6, p. 4. Dr. Stark specifically recommended extending the cover to "cover about 183 acres and leave only about 13 acres at the southern end of the [Landfill] uncovered for current disposal operations." See **Enclosure A** at Exhibit 6, p. 5. CalRecycle also recommended installing geomembrane cover "over the approximately 100 acres outside of the current geomembrane cover." See **Enclosure C**, CalRecycle Letter at p. 19.

CCL reported to the LEA that it completed the installation of 30-mil HDPE geosynthetic cover over approximately 44.6 acres of the reaction area and over approximately 1.3 acres over the disposal area in accordance with the west toe drain workplan, as of January 17, 2025. See **Enclosure D**. CCL has reported that "[t]he cover has contributed to the substantial decrease of odors at the Landfill." See **Enclosure E** at p. 4.

Notwithstanding completion of the initial geomembrane cover, members of the community surrounding the Landfill continue to report odors from the Landfill. According to CCL's Notice of Violation Log, available at <https://chiquitacanyon.com/reports/notice-of-violation-log/>, SCAQMD has issued approximately 50 Notices of Violation to CCL for discharging air contaminants from the Landfill, based on odor complaints from the community, between February 2025 and July 8, 2025.

State and local regulatory agencies agree that expanding the geomembrane cover will address the ongoing odor issues. DTSC stated: "Extending the area covered by a geomembrane is necessary to adequately control infiltration of oxygen and water into the landfill waste, and to control production of gas emissions, odors, and leachate." See **Enclosure A** at p. 11. CCL has even acknowledged that the geomembrane cover can effectively mitigate odors: "Chiquita agrees that installation of additional cover may be an appropriate method for mitigating potential odor impacts." See **Enclosure E** at p. 4.

EPA concurs with the state and local regulatory agencies that covering the remaining uncovered portion of the Landfill with geomembrane cover is a necessary and appropriate measure to control the Landfill reaction and related odors. Expanding and improving the geomembrane cover will, among other things, control the migration of odors from the Landfill and, therefore, mitigate off-site impacts from odors or emissions.

Further, extending the geomembrane cover will control infiltration of oxygen and water into the landfill mass, which can help prevent the expansion of the smoldering or subsurface reaction occurring at the Landfill.

The Additional Work, therefore, serves the dual objectives of the Master Work Plan and the UAO, as set forth above.

Moreover, the Additional Work is necessary to meet the broader objective of the UAO to address the imminent and substantial endangerment to the public health or welfare from the Landfill resulting from the release or threatened release of a hazardous substance.

C. Submittal of Work Plan and Opportunity to Meet and Confer

EPA directs CCL to submit a Work Plan for the Additional Work within fifteen (15) days of this letter to EPA for approval, in accordance with Paragraph 90 of the UAO. Within five (5) days after the receipt of this letter, CCL shall have the opportunity to meet or confer with EPA to discuss the Additional Work. On approval of the Work Plan for the Additional Work, Respondent shall implement the Work Plan in accordance with the schedule and provisions contained therein, and the Work Plan for the Additional Work shall be incorporated by reference into the UAO.

If you have any questions or comments regarding this letter, or if you wish to exercise the opportunity to meet and confer, please contact Laura Friedli, EPA Attorney Advisor, at (415) 972-3325 or Friedli.Laura@epa.gov.

Sincerely,

**AMY MILLER-
BOWEN**

Digitally signed by AMY
MILLER-BOWEN
Date: 2025.07.23 17:01:34
-07'00'

Amy C. Miller-Bowen
Enforcement and Compliance Assurance Division
Director
U.S. Environmental Protection Agency, Region 9

**MICHAEL
MONTGOMERY**

Digitally signed by MICHAEL
MONTGOMERY
Date: 2025.07.24 16:59:11 -07'00'

Michael Montgomery
Superfund and Emergency Management Division
Director
U.S. Environmental Protection Agency, Region 9

Enclosures

Enclosure A – DTSC ISE Order

Enclosure B – LEA Compliance Order

Enclosure C – LEA March 2025 Letter attaching CalRecycle March 2025 Letter

Enclosure D – Cover Completion Report

Enclosure E – CCL Notice of Intent to Comply with DTSC ISE Order

cc: John Perkey, Waste Connections

Jim Little, Waste Connections

Kurt Shaner, Waste Connections

Sarah Phillips, Waste Connections

Megan Morgan, Beverage & Diamond

Nicole Weinstein, Beverage & Diamond

Allyn Stern, Beverage & Diamond

Todd Sax, California Environmental Protection Agency

Joel Jones, United States Environmental Protection Agency

Roshni Brahmhatt, United States Environmental Protection Agency

Kaoru Morimoto, United States Environmental Protection Agency

Rick Sakow, United States Environmental Protection Agency

Tyler Holybee, United States Environmental Protection Agency

Mark Anthony Relon, United States Environmental Protection Agency

Tara Frost, United States Environmental Protection Agency

Laura Friedli, United States Environmental Protection Agency

ATTACHMENT F

1 Paul S. Chan (SBN 183406)
pchan@birdmarella.com
2 Ariel A. Neuman (SBN 241594)
aneuman@birdmarella.com
3 Shoshana E. Bannett (SBN 241977)
sbannett@birdmarella.com
4 BIRD, MARELLA, RHOW,
5 LINCENBERG, DROOKS &
6 NESSIM, LLP
7 1875 Century Park East, 23rd Floor
Los Angeles, California 90067-2561
8 Telephone: (310) 201-2100

9 Jacob P. Duginski (SBN 316091)
jduginski@bdlaw.com
10 BEVERIDGE & DIAMOND P.C.
11 333 Bush Street, Suite 1500
12 San Francisco, CA 94104
13 Telephone: (415) 262-4000

14 *Attorneys for Defendants Chiquita*
15 *Canyon, LLC, Chiquita Canyon, Inc. and*
16 *Waste Connections US, Inc.*

17 **UNITED STATES DISTRICT COURT**

18 **CENTRAL DISTRICT OF CALIFORNIA, WESTERN DIVISION**

19 THE PEOPLE OF THE STATE OF
20 CALIFORNIA, by and through Dawyn
21 R. Harrison, County Counsel for the
County of Los Angeles, and THE
COUNTY OF LOS ANGELES,

22 Plaintiffs,

23 vs.

24 CHIQUITA CANYON, LLC, a
Delaware limited liability company;
25 CHIQUITA CANYON, INC., a
Delaware corporation; and WASTE
26 CONNECTIONS US, INC., a Delaware
corporation,

27 Defendants.
28

Kaitlyn D. Shannon (SBN 296735)
kshannon@bdlaw.com
Megan L. Morgan (*pro hac vice*)
mmorgan@bdlaw.com
James B. Slaughter (*pro hac vice*)
jslaughter@bdlaw.com
BEVERIDGE & DIAMOND P.C.
1900 N Street, NW, Suite 700
Washington, DC 20036-1661
Telephone: (202) 789-6040

Katelyn E. Ciolino (*pro hac vice*)
kciolino@bdlaw.com
BEVERIDGE & DIAMOND P.C.
825 Third Avenue, 16th Floor
New York, NY 10022
Telephone: (212) 702-5428

CASE NO. 2:24-cv-10819-MEMF-
MAR

**DECLARATION OF CRAIG H.
BENSON, PHD, PE, BCGE, BCEE,
NAE**

Filed Concurrently with Opposition to
Motion for Preliminary Injunction

Date: July 17, 2025

Time: 10:00 a.m.

Assigned to Hon. Maame Ewusi-
Mensah Frimpong, Courtroom 8B

DECLARATION OF CRAIG H. BENSON, PhD, PE, BCGE, BCEE, NAE

I, Craig H. Benson, PhD, PE, BCGE, BCEE, NAE, declare:

1. I have been engaged by Defendants' Chiquita Canyon, LLC, Chiquita Canyon, Inc., and Waste Connections US, Inc. (collectively, "Chiquita Defendants") to provide expertise regarding the Chiquita Canyon Landfill (the "Landfill"), in support of Defendants' opposition to Plaintiffs' Motion for Preliminary Injunction in the above-captioned action. This Declaration sets forth my professional opinions regarding the Chiquita Canyon Landfill's ongoing Elevated Temperature Landfill ("ETLF") event. My opinions in this Declaration are based on industry standards and are stated to a reasonable degree of scientific and engineering certainty. If called as a witness, I could and would testify competently to the material facts and opinions herein.

2. This Declaration is based on my assessments to date, which were conducted over a limited time frame. With additional time, I could have and would have done additional analysis. My opinions could change with additional information and analysis. I reserve the right to update my opinions should additional information become available.

3. I hold the titles of Wisconsin Distinguished Professor Emeritus at the University of Wisconsin-Madison and Dean of Engineering Emeritus at the University of Virginia. I have a PhD in engineering with a focus on landfills and waste containment, and nearly 40 years of experience in engineering research and practice related to municipal solid waste ("MSW") landfills and solid waste containment systems as a Wisconsin Distinguished Professor Emeritus at the University of Wisconsin-Madison and as Dean of Engineering Emeritus at the University of Virginia. I am a board-certified environmental engineer by the American Academy of Environmental Engineering and Scientists ("AAEES") and board-certified geotechnical engineer by the Geo-Institute of the American Society

1 of Civil Engineers. I am an elected member of the US National Academy of
2 Engineering (“NAE”) and am past-Chair of NAE Section 4 on Civil and
3 Environmental Engineering.

4 4. I have extensive experience working on landfills and waste
5 containment systems for a diversity of waste streams at locations throughout the
6 United States, Canada, South America, Europe, Africa, Japan, Australia, and New
7 Zealand. This experience has provided me with a broad and detailed knowledge of
8 operational and design issues for landfills and other waste containment systems.

9 5. I served as a co-Principal Investigator on an expert team of engineers
10 charged by the Environmental Research and Education Foundation (“EREF”) to
11 develop an understanding of MSW landfills with elevated temperatures that persist
12 over large areas, which are referred to as ETLFs. This expert team, referred to as
13 the EREF ETLF team, was charged with understanding causative mechanisms for
14 the persistent high temperatures at ETLFs, identifying strategies to prevent ETLFs,
15 and recommending best management practices for ETLFs.

16 6. I have been engaged in evaluating many of the major ETLFs over the
17 past two decades, including those at Countywide Landfill, Congress Landfill,
18 Waimanalo Gulch Landfill, Bridgeton Landfill, Middle Point Landfill, and Bristol
19 Landfill. I am currently engaged as the expert engineer for the Bristol Landfill in
20 Bristol, Virginia, providing oversight, review, and recommendations associated
21 with managing the Bristol ETLF. I am also engaged as an engineering expert
22 evaluating conditions and practices at the Middle Point Landfill ETLF in
23 Murfreesboro, Tennessee. I have published referred research papers regarding
24 mechanisms contributing to heat accumulation in ETLFs, thermal properties of
25 MSW affecting heat transfer in ETLFs, pyrolytic reactions in ETLFs, and
26 temperature-dependent compression and settlement of MSW. Causative
27 mechanisms and best management practices to address ETLFs was one of the
28

1 lecture themes for my 2024 Kappe Lecture series tour for the American
2 Association of Environmental Engineers and Scientists.

3 7. My education, training, professional background, and expertise are
4 summarized in my curriculum vitae, attached as **Exhibit A**.

5 8. I have been engaged as an expert by a broad range of private sector
6 and public sector entities. My public sector engagements include the US
7 Environmental Protection Agency, US Department of Energy, US Nuclear
8 Regulatory Commission, US Department of Defense, Wisconsin Department of
9 Natural Resources, Iowa Department of Natural Resources, Missouri Department
10 of Natural Resources, Tennessee Department of Environmental Conversation,
11 Michigan Department of Environmental Quality, Idaho Department of
12 Environmental Quality, Utah Department of Environmental Quality, Texas
13 Commission on Environmental Quality, Montana Department of Environmental
14 Quality, Wyoming Department of Environmental Quality, and the Virginia
15 Department of Environmental Quality. My private sector engagements include
16 Republic Services Inc., Waste Management Inc., GFL Inc., Cleveland-Cliffs Inc.,
17 Bayer Corporation, Simplot Corporation, Morrow Energy, Evergy Inc., Energy
18 Fuels Resources Inc., Alcoa, and the Electric Power Research Institute.

19
20 **Background on Elevated Temperature Landfills**

21 9. Landfills are highly engineered containment facilities for solid wastes
22 that include engineered barriers and control systems for managing liquids and
23 gases associated with the waste with the objective of protecting groundwater and
24 air. Modern MSW landfills include engineered liners beneath the waste that retain
25 leachate (contaminated water released from the waste) and engineered covers
26 above the waste to control the ingress of precipitation and egress of gases.
27

1 Leachate collection and treatment systems are used to collect the leachate
2 contained on the liner surface, followed by treatment to remove contaminants prior
3 to discharge. Typically, leachate treatment occurs offsite. Gas collection and
4 control systems (“GCCS”) are used to collect gas emitted from the waste and to
5 treat the gas so that it can be discharged to the atmosphere.

6 10. A portion of the organic fraction of MSW placed in a landfill
7 undergoes microbial decomposition. This process produces landfill gas (“LFG”),
8 which is comprised primarily of methane and carbon dioxide under typical
9 conditions along with much smaller fractions of other constituents. Under normal
10 conditions, LFG is collected and treated by the GCCS prior to discharge. In some
11 cases, the treatment system may include combustion or conversion of the methane
12 to produce renewable energy. The microbial decomposition process also produces
13 heat, which results in the waste mass temperature being above ambient
14 atmospheric temperatures. Under normal conditions, heat does not accumulate to a
15 level at which the biological process is inhibited.

16 11. Water is present in waste due to the ingress of precipitation after
17 disposal in the landfill and wetting that may have occurred prior to disposal. Water
18 in contact with waste solids and gases is referred to as leachate. Leachate contains
19 a variety of inorganic and organic constituents that have the potential to impact
20 groundwater and other water resources, and therefore is collected for treatment.
21 Leachate drains by gravity to the bottom of the landfill, where the liner redirects
22 flow laterally to a sump. Leachate in the sump is removed by a pump. In some
23 cases, when drainage within the waste is constrained, vertical extraction wells with
24 pumps are installed in the waste to remove leachate. The wells generally are also
25 used to collect LFG, and are referred to as dual-phase extraction wells, with the
26 two phases being leachate and LFG.

12. The EREF ELTF research team defined ETLFs as MSW landfills with gas wellhead temperatures substantially in excess of 65 °C (150 °F) that persist over a large area for a sustained period of time. This definition has been broadly adopted by practitioners and environmental regulators throughout the United States. The elevated temperatures have a variety of impacts, including alterations in gas composition, higher rates of settlement, alterations in leachate chemistry, and generation of odors. ETLFs differ from MSW landfills with a limited number of wells operating under a higher operating value (HOV) exemption, which are landfill gas wells permitted to operate at a temperature in excess of 55 °C (131 °F). An informal survey I conducted indicated that approximately one-third of the MSW landfills in the United States have at least one gas well operating under an HOV exemption.

13. ETLFs are uncommon. The first ETLF occurred circa 2006. Since then, approximately ten to 15 ETLFs have been recognized. Some of these are described in a fact sheet issued by the US Environmental Protection Agency (“USEPA”)¹.

14. ETLFs occur when exothermic, or heat-releasing, processes within the waste mass generate heat at a rate that is faster than the rate at which the heat can dissipate into the surrounding environment. Consequently, the heat accumulates in the waste, resulting in increasing temperatures. The heat spreads and waste temperatures increase until an equilibrium is reached between the rate of heat generation and the rate heat dissipation.

15. Exothermic reactions are the source of heat in ETLFs. These reactions are known at some ETLFs, such as the exothermic reactions associated with

¹ USEPA, When Does a Municipal Solid Waste Landfill Become an Elevated Temperature Landfill (ETLF)? (Jan. 2022), https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=CESER&dirEntryId=354569.

1 aluminum metal in aluminum processing wastes at the Countywide Landfill in
2 Sparta, Ohio and the Middle Point Landfill in Murfreesboro, Tennessee. At other
3 landfills, such as the Congress Landfill in Chicago, Illinois or and the Bristol
4 Landfill in Bristol, Virginia, the exothermic reactions have not been identified
5 conclusively. The exothermic reactions responsible for ETLFs are generally
6 believed to be abiotic (non-biological in origin) with origins in hydration and
7 carbonation of reactive surfaces in the waste (e.g., some coal combustion and
8 incinerator ashes can have reactive surfaces) and potentially exothermic pyrolysis.

9 16. Very wet or saturated waste and high leachate levels are common in
10 ETLFs, precluding combustion reactions (smoldering combustion, fire) as
11 significant sources of heat. Consequently, the mechanisms causing ETLFs
12 generally are different from landfill fires or smoldering combustion, which are
13 more common near the landfill surface where oxygen is available. Combustion
14 generates charred waste, combustion odors, and gas laden with particulate (smoke),
15 each of which is not common at ETLFs. Strategies to address heat in ETLFs
16 necessarily are very different from those used to manage combustion in MSW.

17 17. ETLFs typically have several common characteristics in addition to
18 the elevated waste and landfill gas temperatures. These include (1) landfill gas
19 composition that differs from that of gas released from conventional microbial
20 decomposition processes in MSW; (2) elevated leachate generation rates; (3)
21 elevated concentrations of inorganic and organic constituents and suspended solids
22 in the leachate; and (4) higher rates of compression of the MSW.

23 18. The elevated temperatures in ETLFs suppress the methanogenic
24 microbial community in MSW associated with decomposing the organic matter in
25 MSW under typical MSW landfill conditions. Consequently, the LFG in ETLFs
26 generally has lower methane content and higher carbon dioxide content compared
27
28

1 to LFG in a landfill operating under conventional conditions with methanogenic
2 microbial decomposition.

3 19. LFG in ETLFs often contains reduced sulfide compounds that are
4 highly odiferous, even at low concentrations. Consequently, LFG from ETLFs has
5 a distinct pungent odor that is different from conventional LFG. Dimethyl sulfide
6 (DMS) is one of the most common of these odiferous reduced sulfide compounds
7 in LFG at ETLFs.

8 20. The elevated temperatures in an ETLF soften the solid components in
9 MSW, reducing the stiffness of the solid matrix in MSW, resulting in increased
10 magnitude and rate of settlement. The softening of the solid matrix also results in
11 the release of moisture that is typically bound within the pores of the waste. This
12 release of moisture is responsible for much of the higher leachate generation rates
13 associated with ETLFs.

14 21. The elevated temperatures and the absence of oxygen in MSW in an
15 ETLF may result in pyrolysis, which is defined as the thermal decomposition of
16 organic matter in the absence of oxygen. The pyrolytic decomposition process
17 results in the release of constituents from the solids to the leachate, a factor
18 responsible for the elevated concentrations of organic constituents in leachate at
19 ETLFs. These organic constituents often include acetone, benzene, toluene, and
20 ketones. Pyrolysis in ETLFs generally is endothermic, meaning that the
21 decomposition process consumes energy. However, pyrolysis can be exothermic
22 (energy and heat releasing) under certain pressure and energy conditions. The role
23 of exothermic pyrolysis in ETLFs is a topic of current research.

24 22. A crock pot is a useful analog to an ETLF. A crock pot is filled with
25 organic solid matter (meats, vegetables, etc.), with the pore spaces between the
26 solids filled with liquid (broth). When the crock pot is first filled, the solids are
27 relatively firm and rigid, and the pore water between the solids is dilute. A lid is
28

1 placed on the upper surface, constraining the release of heat and moisture. Heat is
2 applied to the contents in the pot. This heat for cooking softens the solid matter,
3 which releases substances to the broth. The process also releases an aroma. After a
4 period of sustained heat application, the solid matrix is soft and compressible, and
5 the liquid phase is highly concentrated. These analogous processes occur in the
6 MSW within an ETLF.

7
8 **Chiquita has Followed Best Management and Control Practices for Elevated**
9 **Temperature Landfills**

10
11 23. Even with aggressive actions, dissipation of heat within an ETLF
12 occurs slowly. Noticeable reductions in waste temperature often do not occur for
13 several years after heat removal has been initiated. For example, experience at the
14 Congress Landfill in Illinois has shown that a decade or more is required to
15 dissipate the heat accumulated in an ETLF. Best management practices developed
16 based on findings and recommendations from the EREF ETLF team along with
17 industry experience recognize these limitations, and focus on practical outcomes
18 that minimize impacts while removing heat.

19 24. Heat is released from an ETLF by thermal diffusion into the
20 surroundings and by convection through the removal of LFG and leachate.
21 Thermal diffusion into the surroundings is a slow heat transfer process controlled
22 by thermal conductivity of the MSW and the surroundings. Convection is a more
23 rapid heat removal process, where the heat contained within the MSW is physically
24 extracted when leachate and gas are removed. The heat capacity of liquid is much
25 greater than that of gas. Therefore, aggressive leachate removal is a best
26 management practice and is regarded as the most effective and practical heat
27 removal strategy in ETLFs.

1 25. ETLFs tend to be very wet or saturated, with high leachate levels.
2 Vertical dual-phase extraction wells are often installed in ETLFs to concurrently
3 remove leachate and gas from the waste mass. These wells remove heat that has
4 accumulated in the waste, and also drain liquid-filled pore spaces. Drainage of the
5 pores enhances the gas permeability of the MSW, resulting in more effective
6 removal of gas and management of odors. Thus, best management practices for
7 ETLFs include deployment of a dense network of dual-phase gas collection wells
8 that remove both leachate and gas. The aggressive gas removal via these wells also
9 reduces impacts by reducing odiferous emissions provided that there is an effective
10 gas treatment system.

11 26. Other best management practices that address emissions include
12 application of interim cover to control surface emissions and installation of seals
13 around gas well penetrations. Interim cover using a geomembrane has been found
14 to be very effective, including but not limited to EVOH geomembranes that have
15 very low gaseous diffusion coefficient. Perimeter misting systems can also be
16 applied to treat odiferous gases that could not be captured for treatment, and odor
17 and gas surveillance systems can be installed to detect odors and monitor the
18 concentrations of constituents released into the atmosphere.

19 27. State regulators have mandated that Chiquita Canyon Landfill
20 implement numerous mitigation measures including installing cover to contain
21 surface emissions and additional dual-phase extraction wells. These actions have
22 been undertaken, as described subsequently.

23 28. As detailed in the Declaration of Steve Cassulo, Chiquita Canyon
24 Landfill has implemented these best management practices. Since 2023, 292
25 additional vertical gas wells have been placed that have the capacity for dual-phase
26 extraction, and 170 leachate pumps have been installed in the vertical extraction
27 wells. Cassulo Decl. ¶¶ 16, 34. More pumps are planned for deployment. *Id.* ¶ 34.

Geomembrane has been installed over approximately 46 acres, with an additional geomembrane installation scheduled. *Id.* ¶ 21. A perimeter misting system has been deployed to address odoriferous emissions, odor monitoring is being conducted routinely, drone surveillance has been deployed to monitor for surface emissions, and air monitoring stations have been installed on-site and within the community. *Id.* ¶¶ 48, 51. The monitoring stations include on-location gas chromatography to provide real-time assessment of volatile organic compounds in the atmosphere. *Id.* ¶ 50. Chiquita Canyon Landfill has also installed two thermal oxidizers and one additional flare to treat the gas being extracted. *Id.* ¶¶ 19, 20.

By Following Established Guidance, Chiquita is Succeeding in Mitigating the ETLF's Effects

29. The Declarations of Steve Cassulo and Patrick Sullivan, who is an air quality and LFG systems specialist and Senior Vice President with SCS Engineers, Inc., demonstrate that these practices have had significant impact. Gas extraction at Chiquita Canyon Landfill has nearly doubled since 2023, leachate extraction has increased considerably, with more than 7 million gallons extracted in April 2025 alone, surface exceedances measured by drone have been reduced, sulfide concentrations in the atmosphere have declined steadily, and odor surveillance has shown that the frequency of objectionable odor (defined as an odor index >3+) present in the Landfill surroundings has dropped substantially. *See* Cassulo Decl. ¶ 39; Sullivan Decl. ¶¶ 20, 32, 40 and exhibits.

30. Frequency of odor complaints, while subjective, can be an indicator of the effectiveness of best management practices at ETLFs. The monthly complaint record for 2023, 2024, and 2025 is included in the Sullivan Declaration (Ex. 20)

1 and shows that odor complaints declined by more than a factor of three since the
2 best management practices were implemented.

3 31. Data collected from the temperature monitoring probes (“TMPs”) also
4 indicate that the best management practices are maintaining stable conditions
5 within the landfill. I have reviewed the temperature profiles from the TMPs, and
6 they indicate that temperatures have changed little on a year-on-year basis. Three
7 TMPs have shown larger increases in temperature year-on-year (TMP-8, TMP-11,
8 and TMP-13), but even in these TMPs, the temperatures remain modest and
9 considerably lower than observed at many other ETLFs.

10
11 **Todd Thalhamer’s Report and the County Declarants’ Conclusions are**
12 **Scientifically Unsound and Deviate from Best Practices**

13
14 32. Mr. Thalhamer has provided an assessment of the Chiquita Canyon
15 Landfill ETLF in a letter to Ms. Karen Gork of the Los Angeles County
16 Department of Public Health dated 28 March 2025. He refers to the condition at
17 Chiquita Canyon Landfill as a subsurface elevated temperature (“SET”) event. The
18 SET nomenclature is used by Mr. Thalhamer and one of his collaborators to
19 describe ETLFs, but is not a broadly accepted term in industry, regulatory, or
20 academic environments.

21 33. Mr. Thalhamer correctly recognizes that a portion of Chiquita Canyon
22 Landfill is an ETLF, with persistent elevated temperatures monitored within the
23 waste and at gas well heads, gas composition consistent with ETLF conditions, and
24 accelerated waste settlements due to elevated temperatures. This recognition is
25 consistent with my review of the data and site conditions.

26 34. My review of Mr. Thalhammer’s report indicates that he has not
27 identified the mechanisms responsible for the elevated temperatures using the

1 accepted scientific method, which includes hypothesis formulation and evaluation
2 using data and other factors. In the short period in which I have been engaged in
3 this assessment, I have not had the opportunity to evaluate and identify the
4 mechanisms responsible for elevated temperatures. ETLFs are very complex, and
5 understanding the causative mechanisms requires detailed study over a
6 considerable period. Even with a high level of effort, the causative mechanisms
7 frequently are not identified. To my knowledge, no one has drawn firm and
8 defensible conclusions regarding causation of the ETLF at Chiquita Canyon
9 Landfill.

10 35. Mr. Thalhammer has inferred that separate areas of heat generation
11 are evolving within the ETLF in response to gas collection system operations. I
12 found no scientific basis for these inferences based on the information contained in
13 his report.

14 36. Mr. Thalhamer has concluded that the “reaction area is expanding”
15 and that the “containment strategy has failed.” I found no convincing scientific
16 evidence in his report to support this conclusion. My own review of the thermal
17 data that has been collected to date, albeit over the relatively short period in which
18 I have been engaged in this assessment, suggests that the subsurface temperatures
19 that are elevated are stable.

20 37. I found no evidence that the area comprising the ETLF is expanding
21 or that a process is underway that would accelerate expansion. A local equilibrium
22 appears to exist that precludes expansion of the area comprising the ETLF.

23 38. Mr. Thalhamer has concluded that a “soil barrier” must be installed to
24 provide a “thermal block” to prevent expansion of the ETLF. No rational basis for
25 this recommendation is provided and no engineering analysis or design is used to
26 illustrate how this barrier will provide a “thermal block.” My own assessment,
27 albeit in the limited period for which I have had to study the issue, suggest that
28

1 using a soil barrier as a “thermal block” is illogical, inconsistent with
2 thermodynamic principles, and potentially could exacerbate subsurface conditions,
3 emissions, and impacts on the surrounding community. Installation of the soil
4 barrier based on the current logic would be contrary to best management practices
5 from my assessment.

6 39. The facts show that subsurface temperatures have remained relatively
7 stable, airborne emissions have diminished, and complaints have dropped
8 considerably in response to implementation of best management practices at
9 Chiquita Canyon Landfill. These facts suggest that the best management practices
10 have been effective, the ETLF is stable, and impacts on the surrounding
11 community have been reduced. The logical inference from these facts is that the
12 best management practices should continue to be implemented unless new
13 information to the contrary becomes available.

14 **Conclusion**

15
16 40. Chiquita Canyon Landfill is applying the best management and
17 control practices to address the ETLF consistent with site-specific conditions.
18 These practices have been highly successful at other ETLFs and are expected to be
19 successful at Chiquita Canyon Landfill.

20 41. The data suggest that the thermal conditions are stable, and that
21 emissions at Chiquita Canyon Landfill are being managed effectively. The best
22 management practices that are being applied are effective.

23 42. Experience from other ETLFs suggests that application of these best
24 management practices at Chiquita Canyon Landfill will continue to be successful in
25 controlling the impacts, and that the ETLF conditions will diminish over time
26 provided these best management practices are continued.

1 I declare under penalty of perjury under the laws of the State of California that the
2 foregoing is true and correct.

3 Executed on this 12th day of June 2025 in the Town of Middleton, Wisconsin.
4

5 
6

7 Craig H. Benson, PhD, PE, BCGE, BCEE, NAE
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28

Exhibit 1

CRAIG H. BENSON, PHD, PE, BCGE, BCEE, NAE

*Wisconsin Distinguished Professor Emeritus, University of Wisconsin-Madison
Dean of Engineering Emeritus, University of Virginia*

3299 Saracen Way, Verona, Wisconsin, 53593 USA

Phone: +1 (608) 444-0007

Email: chbenson@chbenson.org

EDUCATION

BSCE, Lehigh University - 1985

MSE, University of Texas at Austin – 1987 (Civil Engineering, Geotechnical/Geoenvironmental)

PhD, University of Texas at Austin – 1989 (Civil Engineering, Geotechnical/Geoenvironmental)

REGISTRATION AND APPOINTMENTS

US National Academy of Engineering, Inducted 2012

US National Academy of Inventors, Inducted 2018

American Association for Advancement of Science, Fellow, Inducted 2019

Professional Engineer, State of Wisconsin, License No. 34108-006

Board Certified Environmental Engineer, American Society of Environ. Engrs. & Scientists

Board Certified Geotechnical Engineer, Geo-Institute of the American Society of Civil Engineers

ACADEMIC LEADERSHIP APPOINTMENTS

Dean, School of Engineering, University of Virginia, Charlottesville, Virginia, July 2015 – June 2021
(Reappointed June 2020, Retired July 2021, Emeritus December 2022).

Director of Sustainability Research and Education and Co-Director of the Office of Sustainability,
University of Wisconsin, Madison, Wisconsin, 2011-2015.

Chair, Civil & Environmental Engineering, University of Wisconsin, Madison, Wisconsin, 2011-
2015.

Chair, Geological Engineering, University of Wisconsin, Madison, Wisconsin, 2007-2015.

Chair, Civil & Environmental Engineering, University of Washington, Seattle, WA, 2008-August
2009.

Director, Recycled Materials Resource Center, University of Wisconsin, Madison, Wisconsin, 2007-
2011. ①

Director, Wisconsin Geotechnics Laboratory, University of Wisconsin, Madison, Wisconsin, 2000-
2015.

Management Board, Consortium for Risk Evaluation and Stakeholder Participation, US
Department of Energy, 2009-present. ①

Associate Chair for Environmental Science and Engineering, Dept. of Civil & Environmental
Engineering, University of Wisconsin, Madison, Wisconsin, 2004-2007.

Co-Director, Consortium for Fly Ash Use in Geotechnical Engineering, University of Wisconsin-
Madison, Co-Director, 1999-2007.

PROFESSIONAL AND COMMUNITY LEADERSHIP APPOINTMENTS

Roundtable Linking Defense Basic Research to Leading Academia Research and Engineering Communities, National Academy of Engineering and US Department of Defense, 2019-2021.
Board of Trustees, Lehigh University, Bethlehem, Pennsylvania, 2018-2021.
Engineering Advisory Board, Lehigh University, Bethlehem, Pennsylvania, 2018-2020.
Sustainability Advisory Panel, ExxonMobil Corporation, Irving, Texas, 2017-2023 (disbanded).
National Academy of Engineering, Washington, DC.
Committee on Awards (2019-2022, Vice Chair 2020-2021, Chair 2021-2022)
Section 4, Chair (2021 – 2023), Vice Chair (2019 – 2021), Secretary (2016 – 2018), Nomination Committee (Chair, 2016 – 2018)
Committee on Grand Challenges and Opportunities in Environmental Engineering and Science for the 21st Century (2017-2018).
Board of Directors, Commonwealth Center for Advanced Manufacturing, Disputanta, Virginia, 2015-2021, Chair (2018-2021), Vice Chair (2016-2018), Executive Committee (2015-2021), Compensation Committee (2018-2021), Governance Committee (Chair, 2016-2018; Vice Chair, 2018-2021).
Advisory Board, Global Waste Research Institute, California Polytechnic Institute at San Louis Obispo, 2010-present.
Board of Directors, Sustain Dane, Madison, Wisconsin, 2014-2015.
Geo Institute of ASCE, Board of Governors, Board Member 2007-2014, Treasurer 2010-11, Vice President 2011-12, President, 2012-13.
Editor-in-Chief, *Journal of Geotechnical and Geoenvironmental Engineering*, 2004-06.
Executive Committee, Committee D18 on Soil & Rock, ASTM International, 2006-2013, Liaison to Geo Institute Board of Governors, 2007-2011, Vice Chair, 2011-2013.
Glacier's End Homeowners Association, Town of Middleton, WI, President, 2012-2015, Vice President, 2010 – 2012, 2020-present.
Independent Technical Review Committee for On-Site Disposal Facilities, US Department of Energy, Appointed by Asst. Secretary J. Rispoli, Chair 2007-2010 (disbanded).
Park Commission, Town of Middleton, Wisconsin, Commissioner, 2010-12.
Research Council, Environmental Research and Education Foundation, 2011-present, Vice Chair 2016-2017, Chair 2017-2018.

INDUSTRY EXPERIENCE

Dr. Benson has been extensively engaged by the environmental, energy, mining, and manufacturing industries over the last 30+ years. His recent roles include specialty engineering consultant, strategy advisor, leadership advisor, expert witness in litigation support, and corporate board director/chair. Dr. Benson's industry experience spans six continents and more than 100 companies. More information on Dr. Benson's industry experience can be provided on request.

FACULTY APPOINTMENTS

Hamilton Endowed Chair in Engineering, University of Virginia, 2015-2022 (Emeritus Dec. 2022).
Honorary Professor, Southwest Jiaotong University, Chengdu, China, 2017.
Adjunct Professor, School of Civil, Environmental, and Mining Engineering, University of Western Australia, Crawley, WA, Australia, July 2015.

Wisconsin Distinguished Professor, University of Wisconsin, Madison, Wisconsin, 2007,
Geological Engineering, Civil & Environ Engineering (Emeritus May 2021).
Affiliate Professor, Nelson Institute for Environmental Studies, University of Wisconsin, Madison,
Wisconsin, 2010-2015.
A.H. Fuller Professor, University of Washington, Seattle, WA, 2008- 2009.
Professor, University of Wisconsin, Madison, Wisconsin, 2000-2007 (joint appointment in
Geological Engineering, Civil & Environmental Engineering).
Associate Professor, University of Wisconsin, Madison, Wisconsin, 1995-2000 (joint appointment
in Geological Engineering, Civil & Environmental Engineering).
Assistant Professor, University of Wisconsin, Madison, Wisconsin, 1990-1995 (joint appointment in
Geological Engineering, Civil & Environmental Engineering).

HONORS AND AWARDS

Professional

L. David Suits Award, Committee D35 on Geosynthetics, ASTM International, 2024
Kappe Lecturer, American Academy of Environmental Engineers and Scientists, 2024 ①
Karl Terzaghi Award, Geo-Institute of the American Society of Civil Engineers, 2021
A. Ivan Johnson Outstanding Achievement Award, ASTM International, 2015
Fellow, ASTM International, 2011
Fellow, American Society of Civil Engineers, 2009
Fellow, Sigma Xi, Scientific Research Honor Society, 2017
Academy of Distinguished Alumni, University of Texas at Austin, 2009 ①
Diplomate, Geotechnical Engineering, Academy of Geo-Professionals, 2009 ①

Research

Lymon C. Reese Distinguished Lecturer, University of Texas at Austin, 2023
Best Paper Award, *Geotextiles and Geomembranes J.*, 2019
Best Paper Award, *Geosynthetics International J.*, 2019
Superior Paper Award, Waste Management Symposium, 2019, 2021, 2024
Spencer J. Buchanan Lecturer, Texas A&M University, 2014 ②
Best Paper Award, Waste Management Symposium, 2014
G. Leonards Lecturer, Purdue University, 2013
Best Paper Honorable Mention (2nd Place), *Geosynthetics International*, 2013.
Ralph B. Peck Award, American Society of Civil Engineers, 2012 ②
Outstanding Article on the Practice of Geotechnical Testing, ASTM International, 2011, 2013
Croes Medal, American Society of Civil Engineers, 1998 and 2008
Alfred P. Noble Prize, American Society of Civil Engineers, 2008
IJOG Excellent Paper Award, Intl. Assoc. Computer Methods & Advances in Geomechanics, 2008
Second Paper Award, Global Waste Management Symposium, 2008
Kellet Mid-Career Research Award, University of Wisconsin, 2005
Walter L. Huber Civil Engineering Research Award, ASCE, 2000
Casagrande Award, American Society of Civil Engineers, 1995
Middlebrooks Award, American Society of Civil Engineers, 1995, 2013
Collingwood Prize, American Society of Civil Engineers, 1994
Distinguished Young Faculty Award, U.S. Department of Energy, 1991
Presidential Young Investigator, National Science Foundation, 1991

Teaching

Polygon Outstanding Instructor Award, College of Engr., Univ. of Wisconsin, 1991, 93, 97
Outstanding Professor Award, ASCE Wisconsin Student Chapter, 1992
Top 100 Educators Award, Wisconsin Students Association, Univ. of Wisconsin, 1991

Professional Service

Honor Medal, Eurasian National University and Kazakhstan Geotechnical Society, 2013
Order of the Engineer, Geo Institute, 2011
Award of Merit, ASTM International, 2011
Richard S. Ladd Standards Development Award, Committee D18, ASTM International, 2002, 03, 04, 06, 08, 11
Special Service Award, Committee D18, ASTM International, 2007

Academics

Ford Foundation Fellowship, Univ. of Texas at Austin, 1989
John A. Focht Endowed Presidential Scholarship in Civil Engr., Univ. of Texas at Austin, 1988
Dawson Endowed Presidential Scholarship in Civil Engr., Univ. of Texas at Austin, 1986
Engineering Foundation Fellowship, University of Texas at Austin, 1985
John B. Carson Prize in Civil Engineering, Lehigh University, 1985
Phi Beta Kappa, Chi Epsilon, and Tau Beta Pi

CONGRESSIONAL TESTIMONY & DISCUSSION

Invited Testimony on Proposed USEPA Regulations Related to Coal Combustion Products; House Small Business Committee, Congressman H. Shuler, Chair (D-NC), 22 July 2010. 
Invited Discussion on Environmental Regulation and Sustainable Materials Management; Senators for Environmental Policy and Sustainability, 29-30 May 2012.

LEADERSHIP DEVELOPMENT

Academic Leadership Program, Committee on Institutional Cooperation, Big10 Academic Alliance, 2010 – 2011. 
Manager's Boot Camp, Center for Executive Education, Haas School of Business, University of California-Berkeley
Negotiations and Influence, Center for Executive Education, Haas School of Business, University of California-Berkeley
Philanthropy Fundamentals: Developing and Stewarding Donors, UW Foundation

UNIVERSITY SERVICE

Academic Council, UW Dept. of Civil and Environmental Engineering (1994-99, Chair 1997-99)
Academic Planning Council, UW Nelson Institute for Environmental Studies (2012-2016)
Ad Hoc Committee on Fossil Fuel Use and Climate Change, UW (2013-2014)
Admissions Chair, UW Geotechnical Engineering Program (1990-2006)
Becker Award Committee, UW Civil and Environmental Engineering (Chair 2002-04)
Bicentennial Commission, Future of Public Education Committee, UVA (2017-2022)
Bollinger Academic Staff Award Committee, UW (2010-11, Chair)
Byron Bird Award Committee, UW College of Engineering (1995)
Chancellor's Campus Budget Model Committee, UW (2013-2014)

Civil and Environmental Engineering Strategic Hiring Committee, UW (2010-12, Chair 2010)
Civil and Environmental Engineering Merit Committee, UW (1998, 2002, 2004-2006, Chair 2002)
Classroom Space Utilization Committee, Co-Chair, UW (2014)
Climate Change Solutions Committee, UW (2013-2015, Chair)
College of Engineering Search Committee for Executive Associate Dean, UW (Chair, 2014)
College of Engineering Leadership Council, UW (2013-2015)
College of Engineering Promotion and Tenure Committee, UW (2014-2015)
College of Engineering Search Committee for Associate Dean for Advancement, UW (2013)
College of Engineering Search Committee for Assistant Dean for Facilities, UW (2013)
College of Engineering Academic Planning and Curriculum Committee, UW (1996-99)
College of Engineering Curriculum Committee, UW (1997-99, 2002-04)
College of Engineering Diversity Committee, UW (2002-04)
Conflict of Interest Oversight Committee, University of Wisconsin (2000-02)
Governance Committee, UW Nelson Institute for Environmental Studies (2012-present).
Graduate Committee, UW Geological Engineering (1999-2006, Chair 1999-2001, 2003-2006)
Master Planning Committee, Deans' Council Representative, University of Virginia (2018-19)
Scholarship Committee, UW Dept. of Civil and Environmental Engineering (1998-2002)
Search Committee for Vice President for Research, UVA (2015-2017)
Search Committee for Assoc. Vice Chancellor for Facilities Planning & Mgmt., UW (Chair, 2012)
Search Committees for UW Geological Engineering (Chair, 1997-98, 2003-04)
Tau Beta Pi, Virginia Alpha Chapter, Advisor, 2019 – 2022.
Undergraduate Committee, UW Geological Engineering (Chair, 2002-2008)
University of Wisconsin Information Technology Committee (2010-12)
University of Wisconsin Honors Committee (2010-2011)

PROFESSIONAL SERVICE & AFFILIATIONS

National Academy of Engineering, 2012- present.
Science Advisory Board, Environmental Engineering Committee, US Environmental Protection Agency, 2015-2018 (committee disbanded).
Steering Committee, Performance and Risk Assessment Community of Practice, US Department of Energy, 2013-2022, co-Chair 2024-present.
Research Council, Environmental Research and Education Foundation, 2013-present, Vice Chair 2015-2016, Chair, 2017-2018.
External Advisory Board, School of Engineering, University of Connecticut (2019)
American Association for the Advancement of Science
Colorado School of Mines
 External Advisory Board, College of Earth Resource Sciences and Engineering (2016)
 External Advisory Board, Dept. of Geology and Geological Engineering (2015, 2018)
 External Advisory Board, College of Engineering (2012)
External Advisory Board, Department of Civil and Environmental Engineering, Vanderbilt University (2015-2022)
External Advisory Board, Engineering School of Sustainable Infrastructure & Environment, University of Florida (2011)
ASTM International
 D18 Executive Committee (2006-13, Vice Chair 2011-13)
 D18.04 - Hydrologic Properties of Soil & Rock (1991-present, Chair 1996-2006)
 D18.14 – Sustainable Geotechnical Construction (founding member, 2008-present)

D18.19 - Frozen Soil & Rock (1992-present)
Geo-Institute of the American Society of Civil Engineers (Fellow ASCE)
Board of Governors (Treasurer 2010-11, V. President, 2011-12, President 2012-13)
Org. Committee, Geo-Chicago 2016: Sustainability, Energy, & Geoenviron. Conf. (2014-16)
Awards Committee (Chair, 1999-01, Member 2023-current)
Editor-in-Chief, *JGGE*, 2004-06, Editor *JGGE*, 1996-99, Ombudsman *JGGE*, 2023-present.
Geoenvironmental Engineering Committee (1990-present, chair 1996-99)
Geo-Strata Magazine Task Force (1997-99)
Technical Publications Committee (1993-99, 2004-2006, BoG Liaison 2010-2013)
TPC Subcommittee on Policies for Specialty Conferences (1997-99)
American Geophysical Union
British Geotechnical Association
Canadian Geotechnical Society
International Geosynthetics Society
National Ground Water Association
North American Geosynthetics Society
Soil Science Society of America

PATENTS

Apparatus and Method for Testing the Hydraulic Conductivity of Geologic Materials, United States Patent No. 6,178,808.
Pressure Plate Extractor, United States Patent No. 6,718,835.
Bentonite Collars for Wellbore Casings, United States Patent No. 9,080,419.

LIVE INTERVIEWS, KEYNOTE AND SPECIAL LECTURES

Performance of Final Covers for Waste Containment Systems: Lessons Learned From the Field, Kappe Lecture, American Academy of Environmental Engineers and Scientists, Drexel University, 2 April 2025.
Elevated Temperature Landfills (ETLFs): Causation, Impacts, and Best Management Practices Learned from the Field, Kappe Lecture, University of Miami, 28 March 2025.
Does Harvesting Coal Ash for Use as Cementitious Material Promote Sustainability? Kappe Lecture, University of Nebraska-Lincoln, 20 February 2025.
Does Harvesting Coal Ash for Use as Cementitious Material Promote Sustainability? Kappe Lecture, Missouri University of Science and Technology, 12 February 2025.
Elevated Temperature Landfills (ETLFs): Causation, Impacts, and Best Management Practices Learned from the Field, Kappe Lecture, St. Louis University, 11 February 2025.
Elevated Temperature Landfills (ETLFs): Causation, Impacts, and Best Management Practices Learned from the Field, College of Engineering and Computer Science (CECE) Distinguished Lecturer Series, University of Central Florida, 5 December 2024.
Performance of Final Covers for Waste Containment Systems: Lessons Learned From the Field, Kappe Lecture, American Academy of Environmental Engineers and Scientists, University of New Mexico, 13 November 2024.
Does Harvesting Coal Ash for Use as Cementitious Material Promote Sustainability? George Mason Univ., Dept. of Civil Engineering Distinguished Speaker Lecture Series, 24 October 2024. ↻

Elevated Temperature Landfills (ETLFs): Causation, Impacts, and Best Management Practices Learned from the Field, Kappe Lecture, American Academy of Environmental Engineers and Scientists. LA County Sanitation District, 25 June 2024, [PDF]; Clemson University, 10 October 2024, [PDF].

Performance of Waste Containment Systems for Long-Lived Waste Forms: Lessons Learned From the Field, Lymon C. Reese Distinguished Lecture, University of Texas at Austin, Austin, Texas, 14 April 2023.

Lessons Learned for the Practicing Engineer: How and When Geosynthetic Clay Liners are Effective for Containment, Keynote Lecture, GeoANZ 1 Advances in Geosynthetics, Brisbane, Queensland, Australia, 9 June 2022.

In-Service Condition of Radon Barriers over Uranium Mill Tailings Disposal Facilities in the United States, Craig H. Benson, National Council on Radiation Protection and Measurements 2022, Bethesda, Maryland, USA, 29 March 2022 [PDF].

Stress-Induced Porewater Pressures in the Vadose Zone Beneath a Composite-Lined Landfill, 3rd International Symposium on Coupled Phenomena in Environmental, Kyoto, Japan, October 2021. [PDF].

Tackling Geoenvironmental Problems in the Unsaturated Zone: Principles and Practice, Keynote Lecture, 12th Asian Regional Conference of the International Association of Engineering Geologists, Jeju Island, Korea, September 2019.

Factors Affecting the Long-term Hydraulic Conductivity of Geosynthetic Clay Liners used in Liners, Workshop on Advances In Characterization of Hydraulic Barrier Performance of GCLs, ASTM International, Denver, Colorado, June 2019.

Using Life Cycle Analysis to Evaluate Options to Promote Infrastructure Sustainability, Sustainability in Urban Planning and Infrastructure, Celfi Sustentabilidad Y Desarrollo, Universidad Nacional de Córdoba, Córdoba, Argentina, May 2019.

Sustainability in Geoengineering: A New Paradigm for Engineering with Earthen Materials, 8th International Congress on Environmental Geotechnics, Hangzhou China, November 2018.

Water Balance Covers for Waste Containment: Engineering with Unsaturated Soils from Theory to Practice, Dr. Arthur T. Corey Distinguished Lecture Series, Colorado State University, Fort Collins, Colorado, October 2018.

Sustainability: Compelling Value Proposition for Engineers, Southwest Jiaotong University, Chengdu, China, November 2017.

Principles of Unsaturated Soil Behavior to Design Water Balance Covers for Waste Containment, Pan-Am UNSAT 2017, Dallas, Texas, November 2017.

Infusing Sustainability into Geotechnics: Opportunity for a New Value Proposition, Geo-Chicago 2016 - Sustainability, Energy, & the Geoenvironment, ASCE Geo-Institute, Chicago, August 2016.

Earthen & Geosynthetic Covers for Mine Waste Containment – Lessons Learned from Case Histories, Symposium on Caps and Covers for Mine Waste, Society for Mining Engineers, Pocatello, Idaho, April 2016.

Civil & Environmental Engineering: Creating a Compelling Value Proposition for the Future, Lehigh University, 150th Anniversary Reunion, April 2016.

Engineering Bentonite-Polymer Composite Materials for Extreme Environmental Applications, T.H. Wu Distinguished Lecture, Ohio State University, March 2016.

Are We Designing for Sustainability? Using Life Cycle Analysis to Assess Sustainability Accomplishment, Higley Endowed Lecture, Case Western Reserve University, April 2015.

Next Generation GCLs with Polymer-Bentonites for Extreme Environmental Applications, Keynote Lecture, Global Waste Research Institute, San Luis Obispo, CA, February 2015.

Landfill Covers: Water Balance, Unsaturated Soils, and the Pathway from Theory to Practice, Spencer J. Buchanan Lecture, Texas A&M University, November 2014. ☐

Polymer-Modified Bentonites for Extreme Environmental Applications, Keynote Lecture, 7th Intl. Conference on Environmental Geotechnics, Melbourne, Australia, November 2014.

Strategies for Long-Term Monitoring and Stewardship, Best Practices for Risk-Informed Remedy Selection, Closure, and Post-Closure Control of Contaminated Sites, National Academy of Sciences, Washington, DC, January 2014.

Sustainable Closure of Waste Containment Systems Using Water Balance Covers: Lessons Learned from a Nationwide Field Experiment, Distinguished Lecture Series, University of Texas at Austin, November 2013.

Organoclays: Barrier Media for Managing Groundwater Flow and Transport At NAPL-Sites, University of Michigan, November 2013.

Solid Waste in the USA: Moving from Disposal to Sustainable Materials and Energy Management, University of California, Los Angeles, November 2013.

Organoclays: Novel Barrier Media for Managing Groundwater Flow and Transport at NAPL-Contaminated Sites, 11th G. A. Leonards Lecture, Purdue Geotechnical Society, April 2013.

Sustainability -- Opportunity for Innovation in the Solid Waste Industry, Engineering Society of Detroit, Keynote, April 2013.

Earthen and Geosynthetic Final Covers for Mine Waste Containment, Geosynthetics in Mining, Pocatello, ID, February 2013.

The Solid Waste Industry as a Sustainability Industry: Moving from Disposal to Materials and Energy Management, Keynote Lecture, Global Waste Management Symposium, Phoenix, AZ, October 2012.

Geosynthetic Clay Liners (GCLs): Lessons Learned from Full-Scale Applications, 2012 Ralph M. Peck Lecture, ASCE Geo Institute, Oakland, CA, March 2012. ☐

Designing Water Balance Covers for Sustainable Waste Containment: Transitioning State-of-the-Art to State-of-the-Practice, GeoCongress 2012, ASCE Geo Institute, Oakland, CA, March 2012.

Unsaturated Geotechnics: Transitioning from State-of-the-Art to State-of-the Practice, 5th Asia-Pacific Conference on Unsaturated Soils, Bangkok, Thailand, February 2012.

Recycled Materials, Infrastructure, and Sustainability, Waste Management Association of Australia National Conference 2011, Adelaide, S. Australia, August 2011.

Novel Developments in Geosynthetic Clay Liner Technology, Innovations in Geosynthetic Materials Used in Environment and Infrastructure Symposium, Ministry of Environment and Ministry of Interior, Almaty, Republic of Kazakhstan, February 2011.

Role of Recycled Materials in Sustainable Infrastructure, Weston Roundtable Lecture, Nelson Institute for Environmental Studies, University of Wisconsin-Madison, January 2011.

Sustainable Bioreactor Landfills: North American State-of-the-Practice and State-of-the-Art in North America, Keynote Lecture, Sixth Asian Pacific International Landfill Symposium, Seoul, Korea, October 2010.

Physical and Chemical Processes Altering Geosynthetic Clay Liners In Situ, Distinguished Lecture Series, Department of Geology, Korea University, Seoul, Korea, October 2010.

Hydraulic & Chemical Properties of Geosynthetic Clay Liners Exhumed from Landfill Final Covers: Lessons Learned from a Decade of Research, Keynote Lecture, 3rd International Symposium on Geosynthetic Clay Liners, International Geosynthetics Society and SKZ – ConSem GmbH, Wurzburg, Germany, September 2010.

Evaluating our Predictive Capabilities in Geoenvironmental Engineering, Distinguished Lecture Series, Dept. of Civil and Materials Engineering, University of Illinois-Chicago, April 2010.

- Prediction in Geoenvironmental Engineering: How Good are our Models?*, Keynote Lecture, GeoFlorida 2010, Advances in Analysis, Design, and Modeling, ASCE Geo Institute, West Palm Beach, FL, February 2010.
- Final Covers for Waste Containment: Lessons Learned from a Nationwide Field Experiment*, Sowers State-of-the-Art Lecture, 12th Annual George F. Sowers Symposium, Georgia Institute of Technology, Atlanta, Georgia, May 2009.
- Chemical Alterations and Their Impact on the Hydrologic Properties of Bentonite*, Monash University, Melbourne, Victoria, Australia, December 2008.
- Hydrology and Settlement in Bioreactor Landfills*, Cutting Edge Technological Advances in Design and Operation, Reducing Leachate Quantity, Spatial Needs, and Costs, and Accelerating Landfill Gas Recovery Rates, World Bank, Washington, DC, November 2007.
- Modeling Unsaturated Flow and Atmospheric Interactions*, Keynote Speaker, Second International Conference on Mechanics of Unsaturated Soils, Weimar, Germany, March 2007.
- Geosynthetic Clay Liners for Waste Containment: Panacea or Future Problem?*, Geosynthetic Research Institute, Drexel University, Philadelphia, November 2005.
- Effects of Heterogeneity on Mineral Fouling of Permeable Reactive Barriers*, 2nd International Conference on Reactive Barriers, Belfast, Northern Ireland, March 2004.
- Lessons Learned from North American Failures*, Keynote Lecture, Fifth International Conference on Environmental Geotechnics, ISSMGE, Rio de Janeiro, Brazil, August 2002.
- Waste Containment Systems: Strategies and Performance*, Keynote Lecture, GeoEnvironment 2002, Australian-New Zealand Geomechanics Society, Newcastle, NSW, Australia, Nov. 2001
- Engineered Barriers*, Keynote Lecture, National Academy of Sciences, Washington, DC, July 2001.
- Solid Waste Containment Systems*, Keynote Lecture (with M. Manassero), GeoEng2000, Melbourne, Australia, November 2000.
- Liners and Covers for Waste Containment*, Keynote Speaker, Fourth Kansai International Geotechnical Forum, Creation of a New Geo-Environment, Japanese Geotechnical Society, Kyoto, Japan, June 2000
- Environmental Geotechnics in the New Millennium*, Keynote Speaker, Geotechnics for Developing Africa, African Geotechnical Society, Durban, South Africa, March 1999.
- Final Covers for Waste Containment Systems: A North American Perspective*, Keynote Speaker, XVII Conference of Geotechnics of Torino, Control and Management of Subsoil Pollutants, Italian Geotechnical Society, Torino, Italy, January 1999.

WEBINARS, SHORTCOURSES, AND VIDEO CLIPS

- Black Goo: What is This Stuff and What Can We Do About It?*, Engineering Science and Wastewater Technology Program, Waste Management Inc., 15 May 2025. 
- Black Goo: What is This Stuff and What Can We Do About It?*, Kappe Lecture Webinar, American Academy of Environmental Engineers and Scientists, 20 March 2025. 
- Principles of Soil Physics and Vadose Zone Hydrology Applied to Practice*, Electric Power Research Institute, 2024. 1 – What is the Vadose Zone?  ; 2 – Quantifying Water Movement in the Vadose Zone  ; 3 – Simulating Variably Saturated Flow for Practical Problems  ; 4 – Measuring Hydraulic Properties in the Laboratory  ; 5 – Measuring Hydraulic Properties in the Field  
- Landfill Design for Coal Combustion Products*, Electric Power Research Institute, 2024. 0–Introduction and course content  ; 1–Basics of CCP Landfills: Foundational Principles and Concepts  ; 2–Geosynthetics in CCP Landfill Design  ; 3A–Principles of Compacted Soil Liners  ; 3B–Construction Considerations for Compacted Clay Liners ; 4–Geosynthetic Clay Liners ; 5–

Leachate Collection Systems [PDF]; 6–*Final Covers for Waste Containment Facilities* [PDF]; 7–*Performance Based Design: Making the Case for Alternative Liners* [PDF]; 8–*Slope Stability for Landfills* [PDF].

Water Balance Covers: Principles, Performance Prediction, and Performance, Iowa Dept. of Natural Resources, 16 July 2024. Entire course [PDF]; Purpose and Scope [PDF]; Introduction to Water Balance Covers [PDF]; Water Balance Cover Modeling [PDF]; Monitoring and Case Histories [PDF].

Black Goo II - Understanding and Treating Black Goo in Landfills, SCS Learning Center, 23 April 2023.

Science Session - Black Goo: The Unseen Challenge in Modern Waste Management, Environmental Research and Education Foundation, 16 August 2023. [PDF]

Identifying and Managing Elevated Temperature Landfills, SCS Learning Center, 27 July 2023. [PDF]

Bentonite-Polymer Composite Geosynthetic Clay Liners for Heap Leach Liners, 5th International Conference on Heap Leach Mining Solutions 2022, Sparks, Nevada, 17 October 2022. [PDF] [starts at 36:34].

Lessons-Learned in the Design and Construction of Capping Systems Used in the Closure of Near Surface Disposal Facilities, International Atomic Energy Agency’s International Low Level Waste Disposal Network (DISPONET) Meeting on Lessons Learned from the Disposal of Low-Level Waste, Bulgaria, 4 October 2022. [PDF]

Enhancing Armored Final Covers for Radioactive Waste Disposal Facilities Through Naturalization, Performance and Risk Assessment Community of Practice, US Dept. of Energy, Washington, DC, 17 August 2022. [PDF]

Plastic Recycling and Upcycling as an Element of Sustainable Waste Management, USAID, Washington, DC, 12 August 2022.

In-Service Condition of Radon Barriers over Uranium Mill Tailings Disposal Facilities in the United States, National Council on Radiation Protection and Measurements 2022, Bethesda, Maryland, 29 March 2022. [PDF]

PFAS Containment by Modern Liner Systems: the Good News – and the Bad!, Craig H. Benson and R. Kerry Rowe, International Geosynthetics Society-North America, 13 January 2022. [PDF]

In-Service Condition of Final Covers Over Historic Uranium Mill Tailings Disposal Facilities, International Webinar Series - Geoenvironmental Engineering: Polluted Land, Waste Management & Sustainability/Resiliency, University of Illinois-Chicago, 15 October 2021. [PDF]

A Career in Environmental Engineering with Geosynthetics, Simak’s Geosynthetics Podcast, 16 March 2021. [PDF]

Bentonite-Polymer Composite Geosynthetic Clay Liners for Containment of Highly Aggressive Leachates, International Webinar Series - Geoenvironmental Engineering: Polluted Land, Waste Management & Sustainability/Resiliency, University of Illinois-Chicago, 29 April 2021. [PDF]

Performance-Based Landfill Liner Design, 21st National Course on Solid Waste Landfill Design, University of Wisconsin Madison, 23 March 2021. [PDF]

Geosynthetic Clay Liners, 21st National Course on Solid Waste Landfill Design, University of Wisconsin Madison, 23 March 2021. [PDF]

Final Covers for Waste Containment Facilities, 21st National Course on Solid Waste Landfill Design, University of Wisconsin Madison, 23 March 2021. [PDF]

Elevated Temperature Landfills, 21st National Course on Solid Waste Landfill Design, University of Wisconsin Madison, 24 March 2021. [PDF]

Stability of Final Covers, 21st National Course on Solid Waste Landfill Design, University of Wisconsin Madison, 23 March 2021. [PDF]

In-Service Condition of Final Covers Over Historic Uranium Mill Tailings Disposal Facilities, Australasian Chapter of the International Geosynthetics Society, 24 February 2021. [PDF]

Geosynthetics in Landfills: Accomplishments and Future Directions, GeoAmericas 2020, 4th Pan American Conference on Geosynthetics, 31 October 2020. 📄

Fundamentals of GCLs as Exceptional Hydraulic Barriers, Webinar 1 of 4, GCL Webinar Series, 12 August 2020. 📄

Bentonite-Polymer Composite GCLs for Aggressive Conditions, Webinar 2 of 4, GCL Webinar Series, 10 November 2020. 📄

Evaluating Chemical Compatibility of Geosynthetic Clay Liners (GCLs), Webinar 3 of 4, GCL Webinar Series, 16 February 2021. 📄

Practical Lessons Learned from Geosynthetic Clay Liner (GCL) Case Histories, Webinar 4 of 4, GCL Webinar Series, 4 August 2021. 📄

GCL Tech Talk: The Science Behind the Magic of Bentonite, 7 April 2020. 📄

GCL Tech Talk: Hydraulic Conductivity of Engineered Bentonite-Polymer Composite (BPC) Materials, 7 April 2020. 📄

Engineering in Real Time: Accelerating the Innovation Cycle, with Jennifer Pulley and Innovation Now, National Public Radio, 13 July 2018. 🎧

The Internet of All Things: LinkLab Collaborative Environment, with Jennifer Pulley and Innovation Now, National Public Radio, 3 July 2018. 🎧

Coal Combustion Residual Containment, Craig H. Benson and John T. Allen, *Geosynthetica*, 15 July 2016. 🎧

Frac-Sand Mining Roundtable, with Joy Cardin on the Joy Cardin Show, Wisconsin Public Radio, 11 May 2015. 🎧

Coal Ash = Environmental Win (when you recycle it), with Dan Weissmann and Marketplace, National Public Radio, 28 April 2014. 🎧

PUBLICATIONS

Refereed Journal Articles: Environmental Containment Systems

Abichou, T., Powelson, D., Aitchison, E., Benson, C., and Albright, W. (2005), Water Balances in Vegetated Lysimeters at a Georgia Landfill, *Soil and Crop Society of Florida Proc.*, 64, 1-8. 🔄

Abichou, T., Benson, C., and Edil, T. (2004), Network Model for Hydraulic Conductivity of Sand-Bentonite Mixtures, *Canadian Geotech. J.*, 41(4), 698-712. 🔄

Abichou, T., Benson, C., and Edil, T. (2002), Micro-Structure and Hydraulic Conductivity of Simulated Sand-Bentonite Mixtures, *Clays and Clay Minerals*, 50(5), 537-545. 🔄

Abichou, T., Benson, C., and Edil, T. (2002), Foundry Green Sands as Hydraulic Barriers: Field Study, *J. Geotech. Geoenvironmental Eng.*, 128(3), 206-215. 🔄

Abichou, T., Benson, C., and Edil, T. (2000), Foundry Green Sands as Hydraulic Barriers: Laboratory Study, *J. Geotech. Geoenvironmental Eng.*, 126(12), 1174-1183. 🔄

Abu-Hassanein, Z., and Benson, C., and Blotz, L. (1996), Electrical Resistivity of Compacted Clays, *J. Geotech. Eng.*, 122(5), 397-407. 🔄

Abu-Hassanein, Z. and Benson, C., Wang, X., and Blotz, L. (1995), Determining Bentonite Content in Soil-Bentonite Mixtures Using Electrical Conductivity, *Geotech. Testing J.*, 19(1), 51-57. 🔄

Albrecht, B. and Benson, C. (2002), Predicting Airflow Rates in the Coarse Layer of Passive Dry Barriers, *J. Geotech. Geoenvironmental Eng.*, 128(4), 338-346. 🔄

Albrecht, B. and Benson, C. (2001), Effect of Desiccation on Compacted Natural Clays, *J. Geotech. Geoenvironmental Eng.*, 127(1), 67-76. 🔄

Albright, W., Benson, C., and Apiwantragoon, P. (2013), Field Hydrology of Landfill Final Covers with Composite Barrier Layers, *J. Geotech. Geoenvironmental Eng.*, 139(1), 1-12. 🔄

- Albright, W., Benson, C., Gee, G., Abichou, T., Tyler, S., Rock, S. (2006), Field Performance of Three Compacted Clay Landfill Covers, *Vadose Zone J.*, 5(6), 1157-1171. ↗
- Albright, W., Benson, C., Gee, G., Abichou, T., Tyler, S., Rock, S. (2006), Field Performance of a Compacted Clay Landfill Final Cover at A Humid Site, *J. Geotech. Geoenvironmental Eng.*, 132(11), 1393-1403. ↗
- Albright, W., Benson, C., Gee, G., Roesler, A., Abichou, T., Apiwantragoon, P., Lyles, B., and Rock, S. (2004), Field Water Balance of Landfill Final Covers. *J. Environ. Quality*, 33(6), 2317-2332. ↗
- Akpinar, M. and Benson, C. (2005), Effect of Temperature on Shear Strength of Two Geomembrane-Geotextile Interfaces, *Geotextiles and Geomembranes*, 23, 443-453. ↗
- Apiwantragoon, P., Benson, C., and Albright, W. (2014), Field Hydrology of Water Balance Covers for Waste Containment, *J. Geotech. Geoenvironmental Eng.*, 04014101. ↗
- Bareither, C., Foley, J., and Benson, C. (2015), Using Surrogate Meteorological Data to Predict the Hydrology of a Water Balance Cover, *J. Geotech. Geoenvironmental Eng.*, 04015092. ↗
- Bareither, C., Benson, C., Barlaz, M., Edil, T., and Tolaymat, T. (2010), Performance of North American Bioreactor Landfills: I. Leachate Hydrology and Waste Settlement, *J. Environmental Engineering*, 136(8), 824-838. ↗
- Bareither, C., Benson, C., and Edil, T. (2012), Effects of Waste Composition and Decomposition on the Shear Strength of Municipal Solid Waste, *J. Geotech. Geoenviron. Eng.*, 138(10), 1161-1174. ↗
- Bareither, C., Benson, C., Cook, E., and Scalia, J. (2020), Hydraulic and Mechanical Behavior of Municipal Solid Waste and High-Moisture Waste Mixtures, *Waste Management*, 105, 540-549. ↗
- Barlaz, M., Bareither, Hossain, A., Saquing, J., Mezzari, I., Benson, C., and Tolaymat, T. (2010), Performance of North American Bioreactor Landfills: II. Chemical and Biological Characteristics, *J. Environmental Engineering*, 136(8), 838-853. ↗
- Benson, C., Albright, W., Waugh, W., Apiwantragoon, P., Tigar, A., and Holbrook, D. (2024), Field Hydrology of Armored Earthen Final Covers With and Without Vegetation, *J. Geotech. Geoenvironmental Eng.*, 150(1), 04023125. **(Editor's Choice)** ↗
- Benson, C., Chen, J., Likos, W., and Edil, T. (2018), Hydraulic Conductivity of Compacted Soil Liners Permeated with Coal Combustion Product Leachates, *J. Geotech. Geoenvironmental Eng.*, 144(4), 04018011. **(Editor's Choice)** ↗
- Benson, C. and Yesiller, N. (2016), Variability of Saturated Hydraulic Conductivity Measurements Made Using a Flexible-Wall Permeameter, *Geotech. Testing J.*, doi: 10.1520/GTJ20150138, 39(3), 476-491. ↗
- Benson, C., Edil, T., and Wang, X. (2012), Evaluation of a Final Cover Slide at a Landfill with Recirculating Leachate, *J. Geotextiles and Geomembranes*, 35, 100-106. ↗
- Benson, C., Oren, A., Gates, W. (2010), Hydraulic Conductivity of Two Geosynthetic Clay Liners Permeated with a Hyperalkaline Solution, *J. Geotextiles and Geomembranes*, 28(2), 206-218. ↗
- Benson, C., Kucukkirca, I., and Scalia, J. (2010), Properties of Geosynthetics Exhumed from the Final Cover at a Solid Waste Landfill, *J. Geotextiles and Geomembranes*, 28, 536-546. ↗
- Benson, C. and Meer, S. (2009), Relative Abundance of Monovalent and Divalent Cations and the Impact of Desiccation on Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 135(3), 349-358. ↗
- Benson, C., Thorstad, P., Jo, H., and Rock, S. (2007), Hydraulic Performance of Geosynthetic Clay Liners in a Landfill Final Cover, *J. Geotech. Geoenvironmental Eng.*, 133(7), 814-827. ↗
- Benson, C., Barlaz, M., Lane, D., and Rawe, J. (2007), Practice Review of Five Bioreactor/Recirculation Landfills, *Waste Management*, 27(1), 13-29. ↗

- Benson, C., Sawangsuriya, A., Trzebiatowski, B., and Albright, W. (2007), Post-Construction Changes in the Hydraulic Properties of Water Balance Cover Soils, *J. Geotech. Geoenvironmental Eng.*, 133(4), 349-359. ☞
- Benson, C., Abichou, T., and Jo, H. (2004), Forensic Analysis of Excessive Leakage from Lagoons Lined with a Composite GCL, *Geosynthetics Intl.*, 11(3), 242-252. ☞
- Benson, C. (2001), Waste Containment: Strategies and Performance, *Australian Geomechanics*, 36(4), 1-25. ☞
- Benson, C., Abichou, T., Albright, W., Gee, G., and Roesler, A. (2001), Field Evaluation of Alternative Earthen Final Covers, *Intl. J. Phytoremediation*, 3(1), 1-21. ☞
- Benson, C., Daniel, D., and Boutwell, G. (1999), Field Performance of Compacted Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 125(5), 390-403. ☞
- Benson, C., Gunter, J., Boutwell, G., Trautwein, S., and Berzanskis, P. (1997), Comparison of Four Methods to Assess Hydraulic Conductivity, *J. Geotech. Geoenvironmental Eng.*, 123(10), 929-937. ☞
- Benson, C., Olson, M., and Bergstrom, W. (1996), Temperatures of Insulated Landfill Liner, *J. Transportation Research Board*, 1534, 24-31. ☞
- Benson, C. and Trast, J. (1995), Hydraulic Conductivity of Thirteen Compacted Clays, *Clays and Clay Minerals*, 43(6), 669-681. ☞
- Benson, C., Chamberlain, E., Erickson, A., and Wang, X. (1995), Assessing Frost Damage in Compacted Clay Liners, *Geotech. Testing J.*, 18(3), 324-333. ☞
- Benson, C., Abichou, T., Olson, M., and Bosscher, P. (1995), Winter Effects on the Hydraulic Conductivity of Compacted Clay, *J. Geotech. Eng.*, 121(1), 69-79. ☞
- Benson, C., Zhai, H., and Wang, X. (1994), Estimating Hydraulic Conductivity of Compacted Clay Liners, *J. Geotech. Eng.*, 120(2), 366-387. ☞
- Benson, C. and Daniel, D. (1994), Minimum Thickness of Compacted Soil Liners: I-Stochastic Models, *J. Geotech. Eng.*, 120(1), 129-152. ☞
- Benson, C. and Daniel, D. (1994), Minimum Thickness of Compacted Soil Liners: II-Analysis and Case Histories, *J. Geotech. Eng.*, 120(1), 153-172. ☞
- Benson, C., Bosscher, P., Lane, D., and Pliska, R. (1994), Monitoring System for Hydrologic Evaluation of Landfill Final Covers, *Geotech. Testing J.*, 17(2), 138-149. ☞
- Benson, C., Zhai, H. and Rashad, S. (1994), Statistical Sample Size for Construction of Soil Liners, *J. Geotech. Eng.*, 120(10), 1704-1724. ☞
- Benson, C. and Othman, M. (1993), Hydraulic and Mechanical Characteristics of Compacted Municipal Solid Waste Compost, *Waste Management and Research*, 11(1), 127-142. ☞
- Benson, C. (1993), Probability Distributions for Hydraulic Conductivity of Compacted Soil Liners, *J. Geotech. Eng.*, 119(3), 471-486. ☞
- Benson, C. and Othman, M. (1993), Hydraulic Conductivity of Compacted Clay Frozen and Thawed In Situ, *J. Geotech. Eng.*, 119(2), 276-294. ☞
- Benson, C. and Daniel, D. (1990), Influence of Clods on Hydraulic Conductivity of Compacted Clay, *J. Geotech. Eng.*, 116(8), 1231-1248. ☞
- Blotz, L., Benson, C., and Boutwell, G. (1998), Estimating Optimum Water Content and Maximum Dry Unit Weight for Compacted Clays, *J. Geotech. Geoenvironmental Eng.*, 124(9), 907-912. ☞
- Bohnhoff, G., Ogorzalek, A., Benson, C., Shackelford, C., and Apiwantragoon, P. (2009), Field Data and Water-Balance Predictions for a Monolithic Cover in a Semiarid Climate, *J. Geotech. Geoenvironmental Eng.*, 135(3), 333-348. ☞
- Bradshaw, S. and Benson, C. (2014), Effect of Municipal Solid Waste Leachate on Hydraulic Conductivity and Exchange Complex of Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 04013038. ☞

- Bradshaw, S., Benson, C., and Scalia, J. (2013), Cation Exchange During Subgrade Hydration and Effect on Hydraulic Conductivity of Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 139(4), 526-538. ↗
- Bradshaw, S., Benson, C., and Rauen, T. (2015), Hydraulic Conductivity of Geosynthetic Clay Liners to Recirculated Municipal Solid Waste Leachates, *J. Geotech. Geoenvironmental Eng.*, 04015074. ↗
- Chen, J., Benson, C., Edil, T., and Likos, W. (2018), Hydraulic Conductivity of Geosynthetic Clay Liners with Sodium Bentonite to Coal Combustion Product Leachates, *J. Geotech. Geoenvironmental Eng.*, 144(3), 0401800. ↗
- Chen, J., Gustitus, S., Lin, H. and Benson, C. (2024), Shear Strength of Bentonite-Polymer Composite Geosynthetic Clay Liners and Geomembranes, *Environmental Geotechnics*, 11(2), 102-111, <https://doi.org/10.1680/jenge.22.00071>. ↗
- Chen, J., Salihoglu, S., Benson, C., Likos, W., and Edil, T. (2019), Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners Permeated with Coal Combustion Product Leachates, *J. Geotech. Geoenvironmental Eng.*, 145(9), 04019038. ↗
- Daniel, D. and Benson, C. (1990), Water Content-Density Criteria for Compacted Soil Liners, *J. Geotech. Eng.*, 116(12), 1811-1830. ↗
- Eun, J., Tinjum, J., Benson, C., and Edil, T. (2017), Equivalent Transport Parameters for Volatile Organic Compounds in Coextruded Geomembrane Containing Ethylene-Vinyl Alcohol, *J. Geotech. Geoenvironmental Eng.*, 144(7), 04018040. ↗
- Eun, J., Tinjum, J., Benson, C., and Edil, T. (2017), Comparison of Volatile Organic Compound (VOC) Transport between Composite Liners with HDPE and Ethylene-Vinyl Alcohol (EVOH) Co-Extruded Geomembranes, *J. Geotech. Geoenvironmental Eng.*, 04017010. ↗
- Eun, J., Tinjum, J., Benson, C., and Edil, T. (2018), Methane Transport Through Simulated Landfill Covers with a PE Geofilm or Ethylene-Vinyl Alcohol (EVOH), LLDPE, or PVC Geomembranes *J. Environmental Eng.*, 144(2): 04017106. ↗
- Foose, G., Benson, C., and Edil, T. (2002), Comparison of Solute Transport in Three Composite Landfill Liners, *J. Geotech. Geoenvironmental Eng.*, 128(5), 391-403. ↗
- Foose, G., Benson, C., and Edil, T. (2001), Predicting Leakage Through Composite Landfill Liners, *J. Geotech. Geoenvironmental Eng.*, 127(6), 510-520. ↗
- Foose, G., Benson, C., and Edil, T. (2001), Analytical Equations for Predicting Concentration and Mass Flux from Composite Landfill Liners, *Geosynthetics Intl.*, 8(6), 551-575. ↗
- Fuhrmann, M., Caldwell, T. Likos, Waugh, W., Williams, M., Benson, C. (2023), Evolving Radon Diffusion Through Earthen Barriers At Uranium Waste Disposal Sites, *J. Environmental Radioactivity*, 262, 107140, <https://doi.org/10.1016/j.jenvrad.2023.107140>. ↗
- Fuhrmann, M., Benson, C., Likos, W., Stefani, N., Michaud, A., Waugh, W., Williams, M. (2021), Radon Fluxes at Four Uranium Mill Tailings Disposal Sites After 20 Years of Service, *J. Environmental Radioactivity*, 237, 106719. ↗
- Fuhrmann, M., Michaud, A., Salay, M., Benson, C., Likos, W., Stefani, N., Waugh, W., Williams, M. (2019), Lead-210 Profiles in Radon Barriers, Indicators of Long-Term Radon-222 Transport, *Applied Geochemistry*, 110, 104434. ↗
- Geng, W., Liu, M., Benson, C., Likos, W., and Gadikota, G. (2024), Morphological Controls on Hydraulic Conductivity and Viscosity of Bentonite-Polymer Composite, *Environmental Geotechnics*, 11(2), 136-144, <https://doi.org/10.1680/jenge.21.00125>. ↗
- Geng, W., Salihoglu, H., Likos, W., and Benson, C. (2024), Index Tests for Geosynthetic Clay Liners Containing Bentonite-Polymer Composites, *Environmental Geotechnics*, 11(2), 112-123 <https://doi.org/10.1680/jenge.22.00072>. ↗

- Gulec, S., Benson, C., and Edil, T. (2005), Effect of Acidic Mine Drainage (AMD) on the Mechanical and Hydraulic Properties of Three Geosynthetics, *J. Geotech. Geoenvironmental Eng.*, 131(8), 937-950, <https://doi.org/10.1680/jenge.22.00072>. ↗
- Gulec, S., Edil, T., and Benson, C. (2004), Effect of Acidic Mine Drainage (AMD) on the Polymer Properties of an HDPE Geomembrane, *Geosynthetics Intl.*, 11(2), 60-72. ↗
- Gustitus, S., Nguyen, D., Chen, J., and Benson, C. (2021), Quantifying Polymer Loading in Bentonite-Polymer Composites Using Loss on Ignition and Total Carbon Analyses, *Geotech. Testing J.*, doi:10.1520/GTJ20200007. ↗
- Hao, Z., Sun, M., Ducoste, J., Benson, C., Luettich, S., Castaldi, M., and Barlaz, M. (2017), Heat Generation and Accumulation in Municipal Solid Waste Landfills, *Environmental Science & Technology*, 51, 12434-12442. ↗
- Hou, J., Sun, R., and Benson, C. (2023), Hydrodynamic Assessment of Bentonite Granule Size and Swelling on Hydraulic Conductivity of Geosynthetic Clay Liners, *Geotextiles and Geomembranes*, 51, 93-103. ↗
- Hou, J., Xie, X., and Benson, C. (2025), Effect of Geomembrane Texturing Method on Geomembrane-Dry GCL Interface Shear Behavior, *Geotextiles and Geomembranes*, 53, 1185-1199. ↗
- Jacobson, K., Lee, S., Somerville, R., McKenzie, D., Benson, C., and Pedersen, J. (2010), Transport of the Pathogenic Prion Protein Through Soils, *J. Environmental Quality*, 39, 1145-1152. ↗
- Jacobson, K., Lee, S., McKenzie, D., Benson, C., and Pedersen, J. (2008), Transport of the Pathogenic Prion Protein Through Landfill Materials, *Enviro. Science & Technology*, 43(6), 2022-2028. ↗
- Jo, H., Benson, C., and Edil, T. (2006), Rate-Limited Cation Exchange in Thin Bentonitic Barrier Layers, *Canadian Geotech. J.*, 43, 370-391. ↗
- Jo, H., Benson, C., Lee, J., Shackelford, C., and Edil, T. (2005), Long-Term Hydraulic Conductivity of a Non-Prehydrated Geosynthetic Clay Liner Permeated with Inorganic Salt Solutions, *J. Geotech. Geoenvironmental Eng.*, 131(4), 405-417. ↗
- Jo, H., Benson, C., and Edil, T. (2004), Hydraulic Conductivity and Cation Exchange in Non-Prehydrated and Prehydrated Bentonite Permeated with Weak Inorganic Salt Solutions, *Clays and Clay Minerals*, 52(6), 661-679. ↗
- Jo, H., Katsumi, T., Benson, C., and Edil, T. (2001), Hydraulic Conductivity and Swelling of Non-Prehydrated GCLs Permeated with Single Species Salt Solutions, *J. of Geotech. Geoenvironmental Eng.*, 127(7), 557-567. ↗
- Katsumi, T., Benson, C., Foose, G., and Kamon, M. (2001), Performance-Based Design of Landfill Liners, *Engineering Geology*, 60, 139-148. ↗
- Katsumi, T., Benson, C., Foose, G., and Kamon, M. (1999), Evaluation of the Performance of Landfill Liners, *J. Japan Society of Waste Management*, 10(1), 75-85. ↗
- Khire, M., Benson, C., and Bosscher, P. (2000), Capillary Barriers: Design Variables and Water Balance, *J. Geotech. Geoenvironmental Eng.*, 126(8), 695-708. ↗
- Khire, M., Benson, C., and Bosscher, P. (1999), Field Data from a Capillary Barrier in Semi-Arid and Model Predictions with UNSAT-H, *J. Geotech. Geoenvironmental Eng.*, 125(6), 518-528. ↗
- Khire, M., Benson, C., and Bosscher, P. (1997), Water Balance of Two Earthen Landfill Caps in a Semi-Arid Climate, *Land Contamination and Reclamation*, 5(3), 195-202. ↗
- Khire, M., Benson, C., and Bosscher, P. (1997), Water Balance Modeling of Earthen Final Covers, *J. Geotech. Geoenvironmental Eng.*, 123(8), 744-754. ↗
- Kim, H. and Benson, C. (2004), Contributions of Advective and Diffusive Oxygen Transport Through Multilayer Composite Caps Over Mine Waste, *J. Contaminant Hydrology*, 71(1-4), 193-218. ↗

- Kolstad, D., Benson, C., and Edil, T. (2004), Hydraulic Conductivity and Swell of Nonprehydrated GCLs Permeated with Multispecies Inorganic Solutions, *J. Geotech. Geoenvironmental Eng.*, 130(12), 1236-1249. ↗
- Kolstad, D., Benson, C., Edil, T., and Jo, H. (2004), Hydraulic Conductivity of a Dense Prehydrated GCL Permeated with Aggressive Inorganic Solutions, *Geosynthetics Intl.*, 11(3), 233-240. ↗
- Kraus, J., Benson, C., Erickson, A., and Chamberlain, E. (1997), Freeze-Thaw and Hydraulic Conductivity of Bentonitic Barriers, *J. Geotech. Geoenvironmental Eng.*, 123(3) 229-238. ↗
- Kraus, J., Benson, C., Maltby, V., and Wang, X. (1997), Field and Laboratory Hydraulic Conductivity of Compacted Papermill Sludges, *J. Geotech. Geoenviron. Eng.*, 123(7), 654-662. ↗
- Lee, J., Shackelford, C., Benson, C., Jo, H., and Edil, T. (2005), Correlating Index Properties and Hydraulic Conductivity of Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 131(11), 1319-1329. ↗
- Li, Q., Chen, J., Benson, C., and Chen, D. (2020), Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners Permeated with Bauxite Liquor, *J. Geotextiles and Geomembranes*, 49, 420-429. ↗
- Lin, L. and Benson, C. (2000), Effect of Wet-Dry Cycling on Swelling and Hydraulic Conductivity of Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 126(1), 40-49. ↗
- Ma, X., Benson, C., D. McKenzie, J. Aiken, and J. Pedersen (2007), Adsorption of Pathogenic Prion Protein to Quartz Sand, *Environmental Science and Technology*, 41(7), 2324-2330. ↗
- Makusa, G., Bradshaw, S., Berns, E., Benson, C., Knutsson, S. (2014), Freeze-Thaw Cycling and the Hydraulic Conductivity of Geosynthetic Clay Liners Concurrent with Cation Exchange, *Canadian Geotech. J.*, 51(6), 591-598. **(Editor's Choice)** ↗
- Meer, S. and Benson, C. (2007), Hydraulic Conductivity of Geosynthetic Clay Liners Exhumed from Landfill Final Covers, *J. Geotech. Geoenvironmental Eng.*, 133(5), 550-563. ↗
- Meerdink, J., Benson, C., and Khire, M. (1995), Unsaturated Hydraulic Conductivity of Two Compacted Barrier Soils, *J. Geotech. Eng.*, 122(7), 565-576. ↗
- Ogorzalek, A., Bohnhoff, G., Shackelford, C., Benson, C., and Apiwantragoon, P. (2008), Comparison of Field Data and Water-Balance Predictions for a Capillary Barrier Cover, *J. Geotech. Geoenvironmental Eng.*, 134(4), 470-486. ↗
- Othman, M. and Benson, C. (1993), Effect of Freeze-Thaw on the Hydraulic Conductivity and Morphology of Compacted Clay, *Canadian Geotech. J.*, 30(2), 236-246. ↗
- Othman, M. and Benson, C. (1993), Effect of Freeze-Thaw on the Hydraulic Conductivity of Three Compacted Clays from Wisconsin, *J. Transportation Research Board*, 1369, 118-125. ↗
- Palmer, B., Edil, T. and C. H. Benson (2000), Liners for Waste Containment Constructed with Class F and C Fly Ashes, *J. Hazardous Materials*, 18(2-3), 133-161. ↗
- Park, M., Benson, C., and Edil, T. (2012), Comparison of Batch and Double Compartment Tests for Measuring VOC Transport Parameters in Geomembranes, *J. Geotextiles and Geomembranes*, 31, 15-30. ↗
- Park, M., Edil, T., and Benson, C. (2011), Modeling Volatile Organic Compound Transport in Composite Liners, *J. Geotech. Geoenvironmental Eng.*, 138(6), 641-657. ↗
- Pedersen, J., Johnson, C., Bell, C., Jacobson, K., Benson, C., McKenzie, D., and Aiken, J. (2009), Soil and the Transmission of Prion Diseases, *Geochimica et Cosmochimica Acta Suppl.*, 73, A1007. ↗
- Pedersen, J., McMahon, K., and Benson, C. (2006), Prions: Novel Pathogens of Environmental Concern?, *J. of Environmental Engineering*, 132(9), 967-969. ↗
- Rustick, J., Kosson, D., Krahn, S., Ryan, M., Benson, C., and Clarke, J. (2015), Comparison of Low Level Waste Disposal Facilities at Major Department of Energy Sites, *Remediation*, 26(1), DOI: 10.1002/rem, 69-91. ↗

- Scalia, J., Benson, C., and Finnegan, M. (2018), Alternate Procedures for Swell Index Testing of Granular Bentonite from GCLs, *Geotechnical Testing J.*, 0149-6115. ☞
- Scalia, J., Benson, C., Albright, W., Smith, B., and Wang, X. (2017), Properties of Barrier Components in a Composite Cover after 14 Years of Service and Differential Settlement, *J. Geotech. Geoenvironmental Eng.*, 04017055. ☞
- Scalia, J. and Benson, C. (2016), Polymer Fouling and Hydraulic Conductivity of Mixtures of Sodium Bentonite and a Bentonite-Polymer Composite, *J. Geotech. Geoenvironmental Eng.*, 04016112. **(Research Highlight, April 2017 Issue)** ☞
- Scalia, J., Benson, C., Bohnhoff, G., Edil, T., and Shackelford, C. (2014) Long-Term Hydraulic Conductivity of a Bentonite-Polymer Composite Permeated with Aggressive Inorganic Solutions, *J. Geotech. Geoenvironmental Eng.*, 04013025. ☞
- Scalia, J. and Benson, C. (2011), Hydraulic Conductivity of Geosynthetic Clay Liners Exhumed from Landfill Final Covers with Composite Barriers, *J. Geotech. Geoenvironmental Eng.*, 137(1), 1-13. ☞
- Scalia, J. and Benson, C. (2010), Preferential Flow in Geosynthetic Clay Liners Exhumed from Final Covers with Composite Barriers, *Canadian Geotechnical J.*, 47, 1101-1111. ☞
- Scalia, J. and Benson, C. (2010), Effect of Permeant Water on the Hydraulic Conductivity of Exhumed Geosynthetic Clay Liners, *Geotechnical Testing J.*, 33(3), 1-11. ☞
- Scalia, J., Bohnhoff, G., Shackelford, C., Benson, C., Sample-Lord, K., Malusis, M., and Likos, W. (2018), Enhanced Bentonites for Containment of Inorganic Waste Leachates by GCLs, *Geosynthetics Intl.*, 1072-6349, 1-20 **(Best Paper Award for 2018)**. ☞
- Setz, M., Benson, C., Bradshaw, S., and Tian, K. (2018), Lithium Extraction to Determine Ammonium in the Exchange Complex of Bentonite, *Geotechnical Testing J.*, ISSN 0149-6115. ☞
- Setz, M., Tian, K., Benson, C., and Bradshaw, S. (2017), Effect of Ammonium on the Hydraulic Conductivity of Geosynthetic Clay Liners, *J. Geotextiles and Geomembranes*, 45 (2017) 665-673. ☞
- Shackelford, C., Benson, C., Katsumi, T., and Edil, T. (2000), Evaluating the Hydraulic Conductivity of GCLs Permeated with Non-Standard Liquids, *J. Geotextiles Geomembranes*, 18(2-3), 133-161. ☞
- Smesrud, J., Benson, C., Albright, W., Richards, J., Wright, S., Israel, T., and Goodrich, K. (2012), Using Pilot Test Data to Refine an Alternative Cover Design in Northern California, *Intl. J. Phytoremediation*, 14(S1), 76-93. ☞
- Tinjum, J., Benson, C., and Blotz, L. (1997), Soil-Water Characteristic Curves for Compacted Clays, *J. Geotech. Geoenvironmental Eng.*, 123(11), 1060-1070. ☞
- Tian, K. and Benson, C. (2018), Radiation Dose and Antioxidant Depletion in HDPE Geomembranes, *J. Geotextiles and Geomembranes*, 46, 426-435. **(Best Paper Award for 2018)** ☞
- Tian, K., Benson, C., and Likos, W. (2016), Hydraulic Conductivity of Geosynthetic Clay Liners to Low-Level Radioactive Waste Leachate, *J. Geotech. Geoenvironmental Eng.*, 04016037. ☞
- Tian, K., Likos, W., and Benson, C. (2019), Polymer Elution and Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 145(10), 04019071. ☞
- Tian, K., Benson, C., Tinjum, J. and Edil, T. (2017), Antioxidant Depletion and Service Life Prediction for HDPE Geomembranes Exposed to Low-Level Radioactive Waste Leachate, *J. Geotech. Geoenvironmental Eng.*, 04017011. **(Editor's Choice)**. ☞
- Tian, K., Benson, C., and Tinjum, J. (2017), Chemical Characteristics of Leachate in Low-Level Radioactive Waste Disposal Facilities, *J. Hazardous, Toxic, & Radioactive Waste Mgmt.*, 21(4), 04017010. **(Editor's Choice)**. ☞
- Trast, J. and Benson, C. (1995), Estimating Field Hydraulic Conductivity of Compacted Clay, *J. Geotech. Eng.*, 121(10), 736-740. ☞
- Tuspsakhare, S. Moutushi, T. Luettich, S., Benson, C., Barlaz, M., and Castaldi, M. (2020), The Impact of Pressure, Moisture and Temperature on Pyrolysis of Municipal Solid Waste under

- Simulated Landfill Conditions and Relevance to the Field Data from Elevated Temperature Landfill, *Science of the Total Environment*, 723, 138031. ↗
- Wang, X. and Benson, C. (1999), Hydraulic Conductivity Testing of Geosynthetic Clay Liners Using the Constant Volume Method, *Geotechnical Testing J.*, 22(4), 277-283. ↗
- Wang, X. and Benson, C. (1995), Infiltration and Field-Saturated Hydraulic Conductivity of Compacted Clay, *J. Geotech. Eng.*, 121(10), 713-722. ↗
- Waugh, W., Benson, C., and Albright, W. (2015), Evaluation of Soil Manipulation Methods to Transform Engineered Earthen Covers for Long-Term Waste Containment, *J. Environmental Quality*, doi:10.2134/jeq2015.01.0001. ↗
- Williams, T., Benson, C., Tian, K., Yesiller, N., and Hanson, J., (2024), Hydraulic and Geochemical Characteristics of a Geosynthetic Clay Liner Exhumed from an Exposed Composite Liner, *J. Geotech. Geoenvironmental Eng.*, 150(5), 05024002. ↗
- Yesiller, N., Hanson, J., Risken, J., Benson, C., Abichou, T., and Darius, J. (2019), Hydration Fluid and Field Exposure Effects on Moisture-Suction Response of Geosynthetic Clay Liners, *J. Geotech. Geoenvironmental Eng.*, 145(4): 04019010 (**Editor's Choice**) ↗
- Zhai, H. and Benson, C. (2006), The Log-Normal Distribution for Hydraulic Conductivity of Compacted Clays: Two or Three Parameters?, *Geotechnical and Geological Engineering*, 24(5), 1149-1162. ↗

Refereed Journal Articles: Sustainability and Sustainable Infrastructure

- Aguirre-Villegas, H. and Benson, C. (2022), Expectations for Coal Demand in Response to Evolving Carbon Policy and Climate Change Awareness, *Energies*, 15, 3739. ↗
- Aguirre-Villegas, H. and Benson, C. (2017), Case History of Environmental Impacts of an Indonesian Coal Supply Chain, *J. Cleaner Production*, 157, 47-56. ↗
- Bareither, C., Wolfe, G., McMahon, K., and Benson, C. (2013), Microbial Diversity and Dynamics During Methane Production from Municipal Solid Waste, *Waste Management*, 30, 1982-1992. ↗
- Bareither, C., Breitmeyer, R., Benson, C., Barlaz, M., and Edil, T. (2012), Deer Track Bioreactor Experiment: Field-Scale Evaluation of Municipal Solid Waste Bioreactor Performance, *J. Geotech. Geoenvironmental Eng.*, 138(6), 658-670. ↗
- Bareither, C., Benson, C., and Edil, T. (2012), Compression Behavior of Municipal Solid Waste: Immediate Compression, *J. Geotech. Geoenvironmental Eng.*, 138(9), 1047-1062. ↗
- Bareither, C., Benson, C., and Edil, T. (2013), Compression of Municipal Solid Waste in Bioreactor Landfills: Mechanical Creep and Biocompression, *J. Geotech. Geoenvironmental Eng.*, 139(7), 1007-1021. ↗
- Bareither, C., Benson, C., Edil, T., and Barlaz, M. (2012), Abiotic and Biotic Compression of Municipal Solid Waste, *J. Geotech. Geoenvironmental Eng.*, 138(8), 877-888. ↗
- Bradshaw, S., Aguirre-Villegas, H., Boxman, S., and Benson, C. (2025), Material Recovery Facilities (MRFs) in the United States: Operations, Revenue, and the Impact of Scale, *Waste Management*, 193, 317-327. ↗
- Breitmeyer, R. and Benson, C. (2014), Evaluation of Parameterization Techniques for Unsaturated Hydraulic Conductivity Functions for Municipal Solid Waste, *Geotech. Testing J.*, 37(4) 1-10. ↗
- Breitmeyer, R., Benson, C., and Edil, T. (2020), Effect of Changing Unit Weight and Decomposition on Unsaturated Hydraulic Properties of Municipal Solid Waste In Bioreactor Landfills, *J. Geotech. Geoenvironmental Eng.*, 146(5): 04020021. ↗
- Breitmeyer, R., Benson, C., and Edil, T. (2019), Effects of Compression and Decomposition on Saturated Hydraulic Conductivity of Municipal Solid Waste in Bioreactor Landfills, *J. Geotech. Geoenvironmental Eng.*, 145(4): 04019011. (**Smart Brief**) ↗

- Benson, C. and Khire, M. (1994), Reinforcing Sand with Strips of Reclaimed High Density Polyethylene, *J. Geotech. Eng.*, 120(5), 838-855. ☞
- Bin-Shafique, S., Benson, C., Edil, T., and Hwang, K. (2006), Leachate Concentrations from Water Leach and Column Leach Tests on Fly-Ash Stabilized Soil, *Environmental Engineering Science*, 23(1), 51-65. ☞
- Bin-Shafique, S., Edil, T., and Benson, C. (2004), Incorporating a Fly Ash Stabilized Layer into Pavement Design: Case Study, *Geotechnical Engineering*, 157(4), 239-249. ☞
- Camargo, F., Edil, T., and Benson, C. (2013), Strength and Stiffness of Recycled Pavement Materials Stabilized with Fly Ash: A Laboratory Study, *Road Materials and Pavement Design*, 14(2) 1-13. ☞
- Carpenter, A., Gardner, K., Fopiano, J., Benson, C., and Edil, T. (2007), Life Cycle Based Risk Assessment of Recycled Materials in Roadway Construction, *Waste Mgmt.*, 27, 1458-1464. ☞
- Dingrando, J., Edil, T., and Benson, C. (2004), Beneficial Reuse of Foundry Sands in Controlled Low Strength Material, *J. ASTM Intl.*, 1(6), 1-12. ☞
- Ebrahimi, A., Kootstra, B., Edil, T., and Benson, C. (2012), Practical Approach for Designing Flexible Pavements Using Recycled Roadway Materials as Base Course, *Road Materials and Pavement Design*, 13(3), 1-18. ☞
- Edil, T., Acosta, H., and Benson, C. (2006), Stabilizing Soft Fine-Grained Soils with Fly Ash, *J. Materials in Civil Engineering*, 18(2), 283-294. ☞
- Edil, T., Benson, C., Bin-Shafique, M., Tanyu, B., Kim, W., and Senol, A. (2002), Field Evaluation of Construction Alternatives for Roadway Over Soft Subgrade, *J. Transportation Research Board*, 1786, 36-48. ☞
- Foose, G., Benson, C., and Bosscher, P. (1996), Sand Reinforced with Shredded Waste Tires, *J. Geotech. Eng.*, 122(9), 760-767. ☞
- Goodhue, M. Edil, T., and Benson, C. (2001), Interaction of Foundry Sands with Geosynthetics, *J. Geotech. Geoenvironmental Eng.*, 127(4), 353-362. ☞
- Komonweeraket, K., Cetin, B., Aydilek, A., Benson, C., Edil, T. (2014), Effects of pH on the Leaching Mechanisms of Elements from Fly Ash Mixed Soils, *Fuel*, American Chemical Society, 140, 788-802. ☞
- Komonweeraket, K., Cetin, B., Aydilek, A., Benson, C., and Edil, T. (2015), Geochemical Analysis of Leached Elements from Fly Ash Stabilized Soils, *J. Geotech. Geoenviron. Eng.*, 04015012. ☞
- Komonweeraket, K., Cetin, B., Aydilek, A., Benson, C., Edil, T. (2015), Leaching Characteristics of Toxic Constituents from Coal Fly Ash Mixed Soils under the Influence of pH, *Waste Management*, 38, 174-184. ☞
- Kleven, J., Edil, T., and Benson, C. (2000), Evaluation of Excess Foundry System Sands for Use as Subbase Material, *J. Transportation Research Board*, 1714, 40-48. ☞
- Lee, J., Edil, T., Benson, C., and Tinjum, J., (2013), Building Environmentally and Economically Sustainable Transportation Infrastructure: Green Highway Rating System, *J. Construction Engineering and Management*, 139(12), A4013006. ☞
- Lee, J., Bradshaw, S., Edil, T., and Benson, C. (2012) Quantifying the Benefits of Flue Gas Desulfurization Gypsum in Sustainable Wallboard Production, *Coal Combustion and Gasification Products J.*, 4, 17-20. ☞
- Lee, J., Edil, T., Benson, C., and Tinjum, J., (2011), Evaluation of Variables Affecting Sustainable Highway Design with BE²ST-in-Highways System, *J. Transportation Res. Board*, 2233, 178-186. ☞
- Lee, J., Edil, T., Tinjum, J., and Benson, C. (2010), Quantitative Assessment of Environmental and Economic Benefits of Using Recycled Construction Materials in Highway Construction, *J. Transportation Research Board*, 2158, 138-142. ☞
- Lee, T. and Benson, C. (2006), Leaching Behavior of Green Sands from Gray-Iron Foundries Used for Reactive Barrier Applications, *Environmental Engineering Science*, 23(1), 153-167. ☞

- Li, L., Benson, C., Edil, T., and Hatipoglu, B. (2007), Groundwater Impacts from Coal Ash in Highways, *Waste and Resource Management*, 159(4), 151-162. ↗
- Li, L., Benson, C., Edil, T., and Hatipoglu, B. (2008), Sustainable Construction Case History: Fly Ash Stabilization of Recycled Asphalt Pavement Material, *Geotechnical and Geological Engineering*, 26, 177-187. ↗
- Li, L., Edil, T., and Benson, C. (2009), Mechanical Performance of Pavement Geomaterials Stabilized with Fly Ash in Field Applications, *Coal Combustion and Gasification Products*, 1: 43-49, doi:10.4177/CCGP-D-09-00018.1. ↗
- Li, H. et al. (2022), Expanding Plastics Recycling Technologies: Chemical Aspects, Technology Status, and Challenges, *Green Chemistry*, <https://doi.org/10.1039/D2GC02588D>. ↗
- Liu, X., Wen, H., Edil, T., and Benson, C. (2010), Stabilization of Flue Gas Desulphurization By-Products with Fly Ash, Cement, and Sialite, *J. Transportation Research Board*, 2204, 102-109. ↗
- Ma, J. et al. (2023), Economic Evaluation of Infrastructures for Thermochemical Upcycling of Post-Consumer Plastic Waste, *Green Chemistry*, 2025, 3, <https://doi.org/10.1039/d2gc04005k>. ↗
- Olafasakin, O. et al. (2023), Techno-Economic and Life Cycle Assessment of Standalone Single-Stream Material Recovery Facilities in the United States, *Waste Management*, 166, 368–376. ↗
- Rosa, M., Cetin, B., Edil, T., and Benson, C. (2016), Development of a Test Procedure for Freeze-Thaw Durability of Geomaterials Stabilized with Fly Ash, *Geotech. Testing J.*, 39(6) 938-953. ↗
- Rosa, M., Cetin, B., Edil, T., and Benson, C. (2017), Freeze-Thaw Performance of Fly Ash Stabilized Materials and Recycled Pavement Materials, *J. Materials in Civil Engineering*, 04017015. ↗
- Sauer, J., Benson, C., Aydilek, A., and Edil, T. (2012), Trace Elements Leaching from Organic Soils Stabilized with High Carbon Fly Ash, *J. Geotech. Geoenvironmental Eng.*, 138(8), 968-980. ↗
- Senol, A., Edil, T., Bin-Shafique, S., Acosta, H., and Benson, C. (2006), Soft Subgrade Stabilization Using Fly Ashes, *Resources, Conservation and Recycling*, 46(4), 365-376. ↗
- Senol, A., Bin-Shafique, S., Edil, T., and Benson, C. (2003), Use of Class C Fly Ash for Stabilization of Soft Subgrade, *ARI, Bulletin Istanbul Technical University*, 53(1), 98-104. ↗
- Soleimanbeigi, A., Edil, T., and Benson, C. (2013), Evaluation of Fly Ash Stabilization of Recycled Asphalt Shingles for Use in Structural Fills, *J. Materials Civil Eng.*, 25(1), 94-104. ↗
- Soleimanbeigi, A., Edil, T., and Benson, C. (2014), Creep Response of Recycled Asphalt Shingles, *Canadian Geotechnical J.*, 51, 103-114. ↗
- Soleimanbeigi, A., Edil, T., and Benson, C. (2014), Effect of Temperature on Geotechnical Properties of Recycled Asphalt Shingle Mixtures, *J. Geotech. Geoenvironmental Eng.*, 04014097. ↗
- Tanyu, B., Kim, W., Edil, T., and Benson, C., (2006), Development of Methodology to Include Structural Contribution of Alternative Working Platforms in Pavement Structure, *J. Transportation Research Board*, 1936, 70-77. ↗
- Tanyu, B., Benson, C., Edil, T., and Kim, W. (2005), Equivalency of Crushed Rock and Three Industrial By-Products Used for Working Platforms During Pavement Construction, *J. Transportation Research Board*, 1874, 59-69. ↗
- Tastan, O., Edil, T., Benson, C., and Aydilek, A. (2011), Stabilization of Organic Soils with Fly Ash, *J. Geotech. Geoenvironmental Eng.*, 137(9), 819-833. ↗
- Tatliso, N., Edil, T., and Benson, C. (1998), Interaction between Reinforcing Geosynthetics and Soil-Tire Chip Mixtures, *J. Geotech. Geoenvironmental Eng.*, 124(11), 1109-1119. ↗
- Trzebiatowski, B. and Benson, C. (2005), Saturated Hydraulic Conductivity of Compacted Recycled Asphalt Pavement, *Geotech. Testing J.*, 28(5), 514-519. ↗

Refereed Journal Articles: Groundwater

- Alumbaugh, D., Simon, D. and Benson, C. (2005), Comparison of Three Geophysical Methods for Characterizing Air Flow from an Air Sparging Well, *Near Surface Geophysics, Part II: Applications and Case Histories*, Society of Exploration Geophysicists, 20, 1-12. ↵
- Baker, D. and Benson, C. (2007), Effect of System Variables and Particle Size on Physical Characteristics of Air Sparging Plumes, *Geotechnical and Geological Engineering*, 25(5), 543-558. ↵
- Benson, C., Jo, H., and Musso, T. (2014), Hydraulic Conductivity of an Organoclay and Organoclay-Sand Mixtures to Fuels and Organic Liquids, *J. Geotech. Geoenviron. Eng.*, 125(11), 04014094. ↵
- Christman, M., Benson, C., and Edil, T. (2002), Geophysical Evaluation of Annular Well Seals, *Ground Water Monitoring and Remediation*, 22(3), 104-112. ↵
- Cope, D. and Benson, C. (2009), Grey-Iron Foundry Slags as Reactive Media for Removing Trichloroethylene from Groundwater, *Environ. Science & Technology*, 43(1), 169-175. ↵
- Elder, C. and Benson, C. (2019), Performance and Economic Comparison of PRB Types in Heterogeneous Aquifers, *Environmental Geotechnics*, 6(4), 214-224. ↵
- Elder, C., Benson, C., and Eykholt, G. (2002), Effects of Heterogeneity on Influent and Effluent Concentrations from Horizontal Permeable Reactive Barriers, *Water Resources Research*, 38(8), 27-1 to 27-2. ↵
- Elder, C. and Benson, C., and Eykholt, G. (1999), Modeling Mass Removal During In Situ Air Sparging, *J. Geotech. Geoenvironmental Eng.*, 125(11), 947-958. ↵
- Elder, C. and Benson, C. (1999), Air Channel Formation, Size, Spacing, and Tortuosity During Air Sparging, *Ground Water Monitoring and Remediation*, 19(3), 171-181. ↵
- Eykholt, G., Elder, C., and Benson, C. (1999), Effects of Aquifer Heterogeneity and Reaction Mechanisms Uncertainty on a Reactive Barrier, *J. Hazardous Materials*, 68, 73-96. ↵
- Foose, G., Tachavises, C., Benson, C., and Edil, T. (1998), Analyzing Geoenvironmental Engineering Problems Using MODFLOW, *Naresuan University J.*, Thailand, 6(2), 38-44. ↵
- Lee, S., Oren, A., Benson, C., and Dovantzis, K. (2012), Organoclays as Variably Permeable Reactive Barrier (VPRB) Media to Manage NAPLs in Ground Water, *J. Geotech. Geoenvironmental Eng.*, 138(2), 115-127. ↵
- Lee, T. and Benson, C. (2004), Sorption and Degradation of Alachlor and Metolachlor in Ground Water Using Green Sands, *J. Environmental Quality*, 33(5), 1682-1693. ↵
- Lee, T., Benson, C., and Eykholt, G. (2004), Waste Green Sands as Reactive Media for Groundwater Contaminated with Trichloroethylene, *J. Hazardous Materials*, 109 (1-3), 25-36. ↵
- Lee, T. and Benson, C. (2000), Flow Paste Bench-Scale Vertical Groundwater Cut-Off Walls, *J. Geotech. Geoenvironmental Eng.*, 126(6) 511-520. ↵
- Li, L. and Benson, C. (2010), Evaluation of Five Strategies to Limit the Impact of Fouling in Permeable Reactive Barriers, *J. Hazardous Materials*, 181, 170-180. ↵
- Li, L., Benson, C., and Lawson, E. (2006), Modeling Porosity Reductions Caused by Mineral Fouling in Continuous-Wall Permeable Reactive Barriers, *J. Contaminant Hydrology*, 83 (1-2), 89-121. ↵
- Li, L., Benson, C., and Lawson, E. (2005), Impact of Mineral Fouling on Hydraulic Behavior of Permeable Reactive Barriers, *Ground Water*, 43(4), 582-596. ↵
- Pekarun, O., Benson, C., and Edil, T. (1997), Significance of Defects in Annular Well Seals, *Practice Periodical Hazardous, Toxic, and Radioactive Waste*, 2(2) 1-7. ↵
- Tinjum, J., Benson, C., and Edil, T. (2008), Mobilization of Cr(VI) from Chromite Ore Processing Residue through Acid Treatment, *Science of the Total Environment*, 391, 13-25. ↵
- Tinjum, J., Benson, C., and Edil, T. (2008), Treatment of Cr(VI) in Chromium Ore Processing Residue Using Ferrous Sulfate-Sulfuric Acid or Cationic Polysulfides, *J. Geotech. Geoenvironmental Eng.*, 134(12), 1791-1803. ↵

Yesiller, N., Benson, C., and Edil, T. (1997), Field Evaluation of an Ultrasonic Method for Assessing Well Seals, *Ground Water Monitoring and Remediation*, 17(3), 169-177. ☞

Yesiller, N., Edil, T., and Benson, C. (1997), Ultrasonic Method for Evaluation of Annular Seals for Wells and Instrument Holes, *Geotech. Testing J.*, 20(1), 17-28. ☞

Refereed Journal Articles: Other Topics

Albrecht, B., Benson, C., and Beuermann, S. (2003), Polymer Capacitance Sensors for Measuring Soil Gas Humidity in Drier Soils, *Geotech. Testing J.*, 26(1) 3-12. ☞

Bareither, C. and Benson, C. (2013), Evaluation of Bouwer-Rice Large-Particle Correction Procedure for Soil Water Characteristic Curves, *Geotechnical Testing J.*, 36(5), 680-694. ☞

Bareither, C., Benson, C., and Edil, T. (2008), Reproducibility of Direct Shear Tests Conducted on Granular Backfill Materials, *Geotechnical Testing J.*, 31(1) 1-11. ☞

Bareither, C., Benson, C., and Edil, T. (2008), Comparison of Shear Strength of Sand Backfills Measured in Small-Scale and Large-Scale Direct Shear Tests, *Canadian Geotechnical J.*, 45, 1242-1236. ☞

Bareither, C., Edil, T., Benson, C., and Mickelson, D. (2008), Geological and Physical Factors Affecting the Friction Angle of Compacted Sands, *J. Geotech. Geoenvironmental Eng.*, 134(10), 1476-1489. ☞

Bareither, C., Barlaz, M., Doran, M., and Benson, C. (2016), Retrospective Analysis of Wisconsin's Landfill Organic Stability Rule, *J. Environmental Engineering*, 143(5), 04017001. ☞

Camargo, F., Edil, T., and Benson, C. (2012), An Assessment of Resilient Modulus Testing: Internal and External Deflection Measurements, *Geotechnical Testing J.*, 35(6), 1-8. ☞

Chalermyanont, T. and Benson, C. (2005), Reliability Based Design for External Stability of Mechanically Stabilized Earth (MSE) Walls, *Intl. J. Geomechanics*, 5(3), 196-205. ☞

Chalermyanont, T. and Benson, C. (2004), Reliability-Based Design for Internal Stability of Mechanically Stabilized Earth (MSE) Walls, *J. Geotech. Geoenvironmental Eng.*, 130(2), 163-173. ☞

Fall, M., Sawangsuriya, A., Benson, C., Edil, T., and Bosscher, P. (2008), On the Investigations of Resilient Modulus of Residual Tropical Gravel Lateritic Soils from Senegal (West Africa), *Geotechnical and Geological Engineering*, 26, 13-35. ☞

Jong, D., Bosscher, P., and Benson, C. (1998), Field Assessment of Changes in Pavement Moduli Caused by Freezing and Thawing, *J. Transportation Research Board*, 1615, 41-50. ☞

Kanitpong, K., Benson, C., and Bahia, H. (2001), Hydraulic Conductivity (Permeability) of Laboratory-Compacted Asphalt Mixtures, *J. Transportation Research Board*, 1767, 25-33. ☞

Kim, W., Edil, T., Benson, C., and Tanyu, B., (2006), Deflection of Prototype Geosynthetic-Reinforced Working Platforms Over Soft Subgrade, *J. Transportation Research Board*, 1975, 137-145. ☞

Kim, W., Edil, T., Benson, C., and Tanyu, B., (2005), Structural Contribution Geosynthetic-Reinforced Working Platforms in Flexible Pavement, *J. Trans. Research Board*, 1936, 43-50. ☞

Mengelt, M., Edil, T., and Benson, C. (2006), Resilient Modulus and Plastic Deformation of Soil Confined in a Geocell, *Geosynthetics Intl.*, 13(5), 1-11. ☞

Rosa, M., Cetin, B., Edil, T., and Benson, C. (2016), Development of a Test Procedure for Freeze-Thaw Durability of Geomaterials Stabilized with Fly Ash, *Geotech. Testing J.*, 39(6), 938-953. ☞

Russell, J., Benson, C., and Fox, P. (1990), A Stochastic Decision Model for Contractor Prequalification, *Microcomputers in Civil Engineering*, 5(4), 285-297. ☞

Sawangsuriya, A., Edil, T., and Benson, C. (2008), Effect of Suction on the Resilient Modulus of Compacted Fine-Grained Subgrade Soils, *J. Transportation Research Board*, 2101, 82-87. ☞

- Suwansawat, S. and Benson, C. (1998), Cell Size for Water Content-Dielectric Constant Calibrations for Time Domain Reflectometry, *Geotechnical Testing J.*, 22(1), 3-12. ↗
- Tanyu, B., Aydilek, A., Lau, A., Edil, T., and Benson, C. (2013) Laboratory Evaluation of Geocell-Reinforced Gravel Subbase Over Poor Subgrades, *Geosynthetics Intl.*, 20(2), 47-61. ([Editor's Choice](#)). ↗
- Yesiller, N., Benson, C., and Bosscher, P. (1996), Comparison of Load Restriction Timings Determined Using FHWA Guidelines and Frost Tubes, *J. Cold Regions Eng.*, 10(1), 6-24. ↗
- Wainwright, H. et al. (2023), Nuclear Waste Educator's Workshop: What and How Do We Teach About Nuclear Waste?, *J. Environmental Radioactivity*, 270, 107288. ↗
- Wang, X. and Benson, C. (2004), Leak-Free Pressure Plate Extractor for Measuring the Soil Water Characteristic Curve, *Geotech. Testing J.*, 27(2), 1-10. ↗

Discussions

- Barlaz, M., Benson, C., Castaldi, M., and Luettich, S. (2018), Comment on "Spatial and Temporal Characteristics of Elevated Temperatures in Municipal Solid Waste Landfills," by N. Jafari, T. Stark, and T. Thalhamer, *Waste Management*, 71, 244-245. ↗
- Benson, C. and Edil, T. (2004) Comment on "A Polymer Membrane Containing Fe⁰ as a Contaminant Barrier" by T. Shimitori et al., *Environ. Science and Tech.*, 38(19), 5263. ↗

Refereed Conference Papers

- Abichou, T., Edil, T., Benson, C., and Tawfiq, K. (2004), Hydraulic Conductivity of Foundry Sands and Their Use as Hydraulic Barriers, *Beneficial Reuse of Waste Materials in Geotechnical and Transportation Applications*, GSP No. 127, A. Aydilek and J. Wartman, eds., ASCE, Reston, VA, 186-200. ↗
- Abichou, T., Tawfiq, K., Edil, T., and Benson, C., (2004), Behavior of a Soil-Tire Shreds Backfill for Modular Block Wall, *Beneficial Reuse of Waste Materials in Geotechnical and Transportation Applications*, GSP No. 127, A. Aydilek and J. Wartman, eds., ASCE, Reston, VA, 162-172. ↗
- Abichou, T., Benson, C., Friend, M., and Wang, X. (2002), Hydraulic Conductivity of a Fractured Aquitard, *Evaluation and Remediation of Low Permeability and Dual Porosity Environments*, STP 1415, M. Sara and L. Everett, Eds., ASTM International, West Conshohocken, PA, 25-39. ↗
- Abichou, T., Benson, C., and Edil, T. (1998), Database on Beneficial Reuse of Foundry By-Products, *Recycled Materials in Geotechnical Applications*, GSP No. 79, ASCE, C. Vipulanandan and D. Elton, eds., 210-224. ↗
- Abichou, T., Benson, C., Edil, T., and Freber, B. (1998), Using Waste Foundry Sand for Hydraulic Barriers, *Recycled Materials in Geotechnical Applications*, GSP No. 79, ASCE, C. Vipulanandan and D. Elton, eds., 86-99. ↗
- Akin, I., Chen, J., Benson, C., and Likos, W. (2018), Evaluation of Water Vapor Sorption and Electrical Conductivity Methods to Determine Bentonite Content of a Soil-Bentonite Barrier, *Proc. IFCEE 2018, Developments in Earth Retention, Support Systems, and Tunneling*, GSP No. 297, ASCE, Lemnitzer, A., Stuedlein, A., and Suleiman, M., eds., 238-246. ↗
- Akin, I., Chen, J., Likos, W., and Benson, C. (2017), Water Vapor Sorption of Bentonite-Polymer Mixtures Contacted with Aggressive Leachates, *Geotechnical Frontiers 2017, Waste Containment, Barriers, Remediation, and Sustainable Geoengineering*, GSP No. 276, ASCE, T. Brandon and R. Valentine, eds., 210-218. ↗
- Albright, W., Scalia, J., Benson, C., and Smith, B. (2014), Effects of Age and Differential Settlement on Composite Barrier Components in a Landfill Final Cover, *Proceedings Waste Management '14, WM Symposia Inc.*, Phoenix, AZ, 1-10. (**Best Paper Award**) ↗

- Athanassopoulos, C., Benson, C., Chen, J., and Donovan, M. (2015), Hydraulic Conductivity of a Polymer-Modified GCL Permeated with High-pH Solutions, *Geosynthetics 2015*, IFAI, St. Paul, MN, 181-186. ☞
- Apiwantragoon, P., Benson, C., and Albright, W. (2003), Comparison of Water Balance Predictions Made with HYDRUS-2D and Field Data from the Alternative Cover Assessment Program (ACAP), *Proc. MODFLOW and More 2003: Understanding through Modeling*, International Groundwater Modeling Center, Golden, CO, 751-755. ☞
- Apiwantragoon, P. and Benson, C. (2025), Water Balance Landfill Covers: Hydraulic Performance and Equivalency, *Geoenvironmental Engineering*, GSP No. 362, M. Othman and N. Yesiller, eds., ASCE, Reston, VA, 145-168. ☞
- Baker, D. and Benson, C. (1996), Review of Factors Affecting In Situ Air Sparging, *Non-Aqueous Phase Liquids in Subsurface Remediation*, ASCE, L. Reddi, ed., 292-310. ☞
- Bareither, C., Benson, C., and Edil, T. (2012), Recent Findings on Compressibility of Municipal Solid Waste, *State of the Art and Practice in Geotechnical Engineering*, GSP No. 225, R. Hryciw et al., Eds., ASCE, Reston VA, 4212-4221. ☞
- Bareither, C., Breitmeyer, R., Erses, A., Benson, C., Edil, T., and Barlaz, M. (2008), Relative Contributions of Moisture and Biological Activity on Compression of Municipal Solid Waste in Bioreactor Landfills, *Proceedings, Global Waste Management Symposium 2008*, Penton Media, Orlando, 1-9. ☞
- Bareither, C., Edil, T., and Benson, C. (2012), Investigation of White Bluffs Landslides in Washington State, *State of the Art and Practice in Geotechnical Engineering*, GSP No. 225, R. Hryciw et al., eds., ASCE, Reston VA, 546-555. ☞
- Benson, C., Albright, W., Apiwantragoon, P., and Lyles, B. (2022), Hydrology of Final Covers for Overburden Piles and Pit Backfill at High Elevation Mine Sites in Southeastern Idaho, *Proc. Tailings and Mine Waste*, Colorado State University, 1-12. ☞
- Benson, C. (2017), Using Principles of Unsaturated Soil Behavior to Design Water Balance Covers for Waste Containment: Case Study, *Proc. PanAm Unsaturated Soils 2017, Plenary Papers*, GSP No. 300, L. Hoyos, J. McCartney, S. Houston, and W. Likos, eds., ASCE, Reston VA, 306-324. ☞
- Benson, C. (2017), Characteristics of Gas and Leachate at an Elevated Temperature Landfill, *Geotechnical Frontiers 2017, Waste Containment, Barriers, Remediation, and Sustainable Geoengineering*, GSP No. 276, ASCE, T. Brandon and R. Valentine, eds., 313-322. ☞
- Benson, C. (2013), Impact of Subgrade Water Content on Cation Exchange and Hydraulic Conductivity of Geosynthetic Clay Liners in Composite Barriers, in *Coupled Phenomena in Environmental Geotechnics*, M. Manassero et al., eds., CRC Press, Boca Raton, FL, USA, 1-6. ☞
- Benson, C., Albright, W., Fuhrmann, M., Likos, W., Stefani, N., Tian, K., Waugh, W., and Williams, M. (2017), Radon Fluxes from an Earthen Barrier Over Uranium Mill Tailings After Two Decades of Service, *Proceedings Waste Management '17*, WM Symposia Inc., Phoenix, AZ, 1-10. ☞
- Benson, C., Chen, J., and Tian, K. (2021), Stress-Induced Pore Water Pressures in the Vadose Zone Beneath a Composite Lined Landfill, *Third International Symposium on Coupled Phenomena in Environmental Geotechnics*, Japanese Geotechnical Society Special Publication, Vol. 9, Japanese Geotechnical Society, Tokyo, 478-484. ☞
- Benson, C., Chiang, I., Chalermyanont, T., and Sawangsuriya, A. (2014), Estimating van Genuchten Parameters α and n for Clean Sands from Particle Size Distribution Data, *From Soil Behavior to Innovations in Geotechnical Engineering*, GSP No. 233, M. Iskander, J. Garlanger, and M. Hussein, Eds., ASCE, Reston VA, 410-427. ☞
- Benson, C. and Gurdal, T. (2013), Hydrologic Properties of Final Cover Soils, *Foundation Engineering in the Face of Uncertainty*, GSP No. 229, J. Withiam et al., Eds., ASCE, Reston VA, 283-297. ☞

- Benson, C. and Bareither, C. (2012), Designing Water Balance Covers for Sustainable Waste Containment: Transitioning State-of-the-Art to State-of-the-Practice, *State of the Art and Practice in Geotechnical Engineering, Keynote Lectures from GeoCongress 2012*, GSP No. 226, K. Rollins and D. Zekkos, eds., ASCE, Reston VA, 1-32. ☞
- Benson, C., Tan, Y., Youngblood, J., and Bradshaw, S. (2022), Bentonite-Polymer Composite Geosynthetic Clay Liners for Heap Leach Liners, *Proc. 5th International Conference on Heap Leach Mining Solutions 2022*, C3 Alliance, Vancouver, 13-25. ☞
- Benson, C., Tan, Y., Youngblood, J., and Bradshaw, S. (2023), Effect of Initial Stress on Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners for Heap Leach Liners, *Geosynthetics 2023*, Advanced Textiles Association, Rosemont, MN, 592-603. ☞
- Benson, C. and Tian, K. (2019), Stress-Induced Porewater Pressures in the Vadose Zone Beneath a Mixed Waste Landfill, *Proc. Waste Management '19*, WM Symposia Inc., Phoenix, AZ (**Superior Paper Award**). ☞
- Benson, C., Waugh, W., Albright, W., Smith, G., and Bush, R. (2011), Design and Installation of a Disposal Cell Cover Field Test, *Proc. Waste Management '11*, WM Symposia Inc., Phoenix, AZ. ☞
- Benson, C. and Bareither, C. (2010), Bioreactor Landfills: Lessons Learned in North America, *Proc. Sixth Asian-Pacific Landfill Symposium*, Korean Society of Waste Management, Seoul, 54-72. ☞
- Benson, C. (2010), Predictions in Geoenvironmental Engineering: Recommendations for Reliable Predictive Modeling, *GeoFlorida 2010, Advances in Analysis, Modeling, and Design*, Geotechnical Special Publication No. 199, D. Fratta, A. Puppula, and B. Muhunthan, eds., ASCE, Reston, VA, 1-13. ☞
- Benson, C. and Scalia, J. (2010), Hydraulic Conductivity of Exhumed Geosynthetic Clay Liners from Composite Barriers, *Proc. 3rd Intl. Symposium on Geosynthetic Clay Liners*, SKZ – ConSem GmbH, Wurzburg, Germany, 73-82. ☞
- Benson, C., Wang, X., Gassner, F., and Foo, D. (2008), Hydraulic Conductivity of Two Geosynthetic Clay Liners Permeated with an Aluminum Residue Leachate, *GeoAmericas 2008*, International Geosynthetics Society. ☞
- Benson, C. Albright, W., Ray, D., Smegal, J., Robertson, O., and Gupta, D. (2008). Evaluating Operational Irregularities at Hanford's Environmental Restoration Disposal Facility, *Proc. Waste Management '08*, WM Symposia Inc., Phoenix, AZ. ☞
- Benson, C. (2007), Modeling Unsaturated Flow and Atmospheric Interactions, *Theoretical and Numerical Unsaturated Soil Mechanics*, T. Schanz, Ed., Springer, Berlin, 187-202. ☞
- Benson, C. and Wang, X. (2006), Temperature-Compensating Calibration Procedure for Water Content Reflectometers, *Proceedings TDR 2006: 3rd Intl. Symposium and Workshop on Time Domain Reflectometry for Innovative Soils Applications*, Purdue University, West Lafayette, IN, USA, 50-1 - 5-16. ☞
- Benson, C., Bohnhoff, G., Ogorzalek, A., Shackelford, C., Apiwantragoon, P., and Albright, W. (2005), Field Data and Model Predictions for an Alternative Cover, *Waste Containment and Remediation*, GSP No. 142, A. Alshawabkeh et al., eds., ASCE, Reston, VA, 1-12. ☞
- Benson, C., Tipton, R., Kumthekar, U., and Chiou, J. (2003), Web-Based Data Management System for Long-Term Performance Monitoring and Stewardship of a Low-Level Radioactive Waste Disposal Facility, *Proc. Ninth Intl. Conference on Radioactive Waste Management and Environmental Remediation*, ASME, S16, 1-6. ☞
- Benson, C. and Chen, C. (2003), Selecting the Thickness of Monolithic Earthen Covers for Waste Containment, *Soil and Rock America 2003*, Verlag Gluck auf GMBH, Germany, 1397-1404. ☞
- Benson, C. (2002), Containment Systems: Lessons Learned from North American Failures, *Environmental Geotechnics (4th ICEG)*, Swets and Zeitlinger, Lisse, 1095-1112. ☞

- Benson, C., Albright, W., Roesler, A., and Abichou, T. (2002), Evaluation of Final Cover Performance: Field Data from the Alternative Cover Assessment Program (ACAP), *Proc. Waste Management '02*, WM Symposia Inc., Tucson, AZ. ↵
- Benson, C. (2001), Waste Containment: Strategies & Performance, *Proc. Geoenvironment 2001*, Australia-New Zealand Geomechanics Society, D. Smith, S. Fytus, & M. Allman, eds., 23-52. ↵
- Benson, C. and Boutwell, G. (2000), Compaction Conditions and Scale-Dependent Hydraulic Conductivity of Compacted Clay Liners, *Constructing and Controlling Compaction of Earth Fills*, ASTM STP 1384, D. Shanklin, K. Rademacher, and J. Talbot, Eds., ASTM, 254-273. ↵
- Benson, C. and Wang, X. (2000), Hydraulic Conductivity Assessment of Hydraulic Barriers Constructed with Paper Sludge, *Geotechnics of High Water Content Materials*, STP 1374, ASTM, T. Edil and P. Fox, Eds., 91-107. ↵
- Benson, C. and Bosscher, P. (1999), Remote Field Methods to Measure Frost Depth, *Field Instrumentation for Soil and Rock*, STP 1358, ASTM, G. Durham and W. Marr, Eds., 267-284. ↵
- Benson, C. and Bosscher, P. (1999), Time-Domain Reflectometry in Geotechnics: A Review, *Nondestructive and Automated Testing for Soil and Rock Properties*, STP 1350, ASTM, W. Marr and C. Fairhurst, Eds., 113-136. ↵
- Benson, C. and Gribb, M. (1997), Measuring Unsaturated Hydraulic Conductivity in the Laboratory and Field, *Unsaturated Soil Engineering Practice*, GSP No. 68, ASCE, S. Houston and D. Fredlund, eds., 113-168. ↵
- Benson, C. and Khire, M. (1995), Earthen Covers for Semi-Arid and Arid Climates, *Landfill Closures*, ASCE, GSP No. 53, J. Dunn and U. Singh, eds., 201-217. ↵
- Benson, C., Tinjum, J., and Hussin, C. (1995), Leakage Rates Through Geomembranes Containing Holes, *Geosynthetics 95*, Industrial Fabrics Assoc. Intl., St. Paul 745-758. ↵
- Benson, C., Hardianto, F., and Motan, E. (1994), Representative Specimen Size for Hydraulic Conductivity of Compacted Soil Liners, *Hydraulic Conductivity and Waste Contaminant Transport in Soils*, STP 1142, ASTM, S. Trautwein and D. Daniel, eds., 3-29. ↵
- Benson, C. and Khire, M. (1993), Soil Reinforcement with Strips of Reclaimed HDPE, *Geosynthetics 93*, Industrial Fabrics Assoc. Intl., St. Paul, 935-948. ↵
- Benson, C. and Charbeneau, R. (1991), Reliability Analysis for Time of Travel in Compacted Soil Liners, *Geotechnical Congress 1991*, ASCE, GSP No. 27, 456-467. ↵
- Bergstrom, W., Creamer, P., Petrusha, H., and Benson, C. (1994), Field Performance of a Double Liner Test Pad, *Geoenvironment 2000*, GSP No. 46, ASCE, 608-623. ↵
- Bosscher, P., Jong, D., and Benson, C. (1998), Software to Establish Seasonal Load Limits for Flexible Pavements, *Cold Regions Impact on Civil Works*, D. Newcomb, ed., ASCE, 731-747. ↵
- Bozyurt, O., Tinjum, J., Son, Y., Edil, T., and Benson, C. (2012), Resilient Modulus of Recycled Asphalt Pavement and Recycled Concrete Aggregate, *State of the Art and Practice in Geotechnical Engineering*, GSP No. 225, R. Hryciw et al., Eds., ASCE, Reston VA, 3901-3910. ↵
- Bradshaw, S., Benson, C., Olenbush, E., and Melton, J. (2010), Using Foundry Sand in Green Infrastructure Construction, *Proc. Green Streets and Highways 2010*, ASCE, 280-298. ↵
- Bradshaw, S., Edil, T., and Benson, C. (2025), Greenhouse Gas Impacts of Harvesting Coal Ash for Cement Replacement in Concrete, *Geoenvironmental Engineering*, GSP No. 362, M. Othman and N. Yesiller, eds., ASCE, Reston, VA, 53-67. ↵
- Breitmeyer, R., Bareither, C., Benson, C., Edil, T., and Barlaz, M. (2008), Field-Scale Lysimeter Experiment to Study Hydrologic and Mechanical Properties of Municipal Solid Waste, *Proceedings, Global Waste Management Symposium 2008*, Penton Media, Orlando, 1-11. ↵
- Breitmeyer, R. and Benson, C. (2011), Measurement of Unsaturated Hydraulic Properties of Municipal Solid Waste, *GeoFrontiers 2011 Advances in Geotechnical Engineering*, GSP No. 211, J. Han and D. Alazamora, eds., ASCE, Reston, VA, 1433-1442. ↵

- Brown, B., Benson, C., Edil, T., and Bradshaw, S. (2016), Water Quality Risk Assessment from Roadway Substructures Employing Fly Ash, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 998-1008. ↗
- Chalermyanont, T. and Benson, C. (2005), Method to Estimate the System Probability of Failure of Mechanically Stabilized Earth (MSE) Walls, *Slopes and Retaining Structures Under Seismic and Static Conditions*, GSP No. 140, M. Gabr et al., eds., ASCE, Reston, VA, 1-15. ↗
- Chamberlain, E., Erickson, A. and Benson, C. (1994), Effects of Frost Action on Compacted Clay Barriers, *Geoenvironment 2000*, ASCE, GSP No. 46, 702-717. ↗
- Chen, J., Chen, Z., Gruber, C., Brown, K., Kosson, D., and Benson, C. (2024), Modeling Pre- and Post-Closure Hydrological Conditions of Waste Tanks at the Hanford Sites, Washington, *Proc. Waste Management 2024*, WM Symposia Inc., 24058, 1-8. ↗
- Chen, J. and Benson, C. (2023), Hydrological Evaluation of Placement Strategies for Disposal of Cementitious Waste Forms, *Proc. Waste Management 2023*, WM Symposia Inc., 23045, 1-14. ↗
- Chen, J. and Benson, C. (2022), Using Hydrological Modeling and Particle Tracking to Identify Monitoring Well Locations Near a LLW Disposal Facility, *Proc. Waste Management 2022*, WM Symposia Inc., 22084, 1-5. ↗
- Chen, J. and Benson, C. (2021), Using Perimeter Subsurface Drains to Control Groundwater Levels Beneath Low-level and Mixed Waste Landfills, *Proc. Waste Management '21*, WM Symposia Inc., Phoenix, AZ. **(Superior Paper Award)** ↗
- Chen, J., Benson, C., and Tian, K. (2020), Modeling Stress-Induced Pore Water Pressures in The Vadose Zone Beneath a Composite-Lined Landfill, *Proc. Waste Management '20*, WM Symposia Inc., Phoenix, AZ. ↗
- Chen, J., Benson, C., Likos, W., and Edil, T. (2017), Interface Shear Strength of a Bentonite-Polymer Geosynthetic Clay Liner and a Textured Geomembrane, *Geotechnical Frontiers 2017, Waste Containment, Barriers, Remediation, and Sustainable Geoengineering*, GSP No. 276, ASCE, T. Brandon and R. Valentine, eds., 219-225. ↗
- Chen, J., Benson, C., and Edil, T. (2015), Hydraulic Conductivity of Geosynthetic Clay Liners to Coal Combustion Product Leachates, *Geosynthetics 2015*, IFAI, St. Paul, MN, 173-180. ↗
- Chen, J., Benson, C., and Tian, K. (2018), Hydraulic Conductivity of Bentonite-Polymer Geosynthetic Clay Liners to Coal Combustion Product Leachates, *Proc. 8th Intl. Conference on Environmental Geotechnics*, Springer Nature, Singapore, L. Zhan et al. (Eds.): 664–671, https://doi.org/10.1007/978-981-13-2224-2_82. ↗
- Chen, J., Bradshaw, S., Benson, C., Tinjum, J., and Edil, T. (2012), pH-Dependent Leaching of Trace Elements from Recycled Concrete Aggregate, *State of the Art and Practice in Geotechnical Engineering*, GSP No. 225, R. Hryciw et al., Eds., ASCE, Reston VA, 3729-3738. ↗
- Chen, J., Bradshaw, S., Likos, W., Benson, C., and Edil, T. (2014), Hydraulic Conductivity of Geosynthetic Clay Liners to Synthetic Coal Combustion Product Leachates, Geo-Characterization and Modeling for Sustainability, *Geotechnical Special Publication No. 234*, ASCE, Reston, VA, 334-342. ↗
- Chen, J., Gustitus, S., and Benson, C. (2021), Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners Permeated with Bauxite Liquor, *Proc. Geosynthetics 2021*, Industrial Fabrics Association International, St. Paul, MN, 254-260. ↗
- Chen, J., Gustitus, S., and Benson, C. (2021), Effect of Polymer Elution on Interface Strength Between Bentonite-Polymer Geosynthetic Clay Liners and Geomembranes, *Third International Symposium on Coupled Phenomena in Environmental Geotechnics*, Japanese Geotechnical Society Special Publication, Vol. 9, Japanese Geotechnical Society, Tokyo, 45-48. ↗

- Chen, J., Gustitus, S., and Benson, C. (2021), Using Bentonite-Polymer Composite Geosynthetic Clay Liners to Contain Coal Combustion Product Leachates, *Proc. Geosynthetics 2021*, Industrial Fabrics Association International, St. Paul, MN, 274-281. ☞
- Davis, M., Benson, C., and Roberts, H. (2017), Constructing a Cover Performance Test Section on a Uranium Mill Tailings Management Cell, *Proc. Tailings and Mine Waste*, University of Alberta, 365-376. ☞
- Demirkanli, I., Bence, R., Rockhold, M., Johnson, C., Mangel, A., Morse, M., Holbrook, D., Benson, C., and Denny, A. (2024), Soil Water Balance Model Selection and Benchmark Tests for Evaluating Uranium Mill Tailings Disposal Cell Evapotranspiration Covers, *Proc. Waste Management 2024*, WM Symposia Inc., 24624, 1-15. **(Superior Paper Award)** ☞
- Dingrando, J., Edil, T., and Benson, C. (2004), Beneficial Reuse of Foundry Sands in Controlled Low Strength Material, *Innovations in Controlled Low-Strength Material (Flowable Fill)*, STP 1459, J. Hitch, A. Howard, and W. Bass, eds., ASTM, West Conshohocken, PA. ☞
- Edil, T. and Benson, C. (1998), Geotechnics of Industrial Byproducts, *Recycled Materials in Geotechnical Applications*, GSP No. 79, ASCE, C. Vipulanandan and D. Elton, eds., 1-18. ☞
- Elder, C., Benson, C., and Eykholt, G. (1997), A Model for Predicting Mass Removal During Air Sparging, *In Situ Remediation of the Geoenvironment*, GSP No. 71, J. Evans, ed., ASCE, Reston, VA, 83-97. ☞
- Eun, J., Yilmaz, M., Tinjum, T., and Benson, C. (2017), Temperature Effect on the Transport of VOCs in a Co-extruded EVOH Geomembrane, *Geotechnical Frontiers 2017, Waste Containment, Barriers, Remediation, and Sustainable Geoengineering*, GSP No. 276, ASCE, T. Brandon and R. Valentine, eds., 302-312. ☞
- Eun, J., Yilmaz, M., Tinjum, J., and Benson, C. (2016), Hydrogen Sulfide Transport Through Simulated Interim Covers with Conventional and Co-Extruded Ethylene-Vinyl Alcohol Geomembranes, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 51-61. ☞
- Foose, G., Benson, C., and Edil, T. (1999), Equivalency of Composite Geosynthetic Clay Liners as a Barrier to Volatile Organic Compounds, *Geosynthetics 99*, Industrial Fabrics Association International, St. Paul, MN, 321-334. ☞
- Foose, G., Benson, C., and Edil, T. (1996), Evaluating the Effectiveness of Landfill Liners, *Proc. 2nd Intl. Conference on Environmental Geotechnics*, Osaka, Japan, 217-221.
- Geng, W., Likos, W., Benson, C. (2016), Viscosity of Polymer-Modified Bentonite as a Hydraulic Performance Index, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 498-508. ☞
- Gustitus, S. and Benson, C. (2020), Assessing Polymer Elution and Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners Permeated with Aggressive Solutions, *Proc. GeoAmericas 2020*, April 26-29, 2020, Rio De Janeiro, Brazil. ☞
- Gustitus, S. and Benson, C. (2021), Flow-Swell Index as an Indicator of Chemical Compatibility of Bentonite-Polymer Composite Geosynthetic Clay Liners, *Proc. Geosynthetics 2021*, Industrial Fabrics Association International, St. Paul, MN, 282-292. ☞
- Gustitus, S. and Benson, C. (2023), Hydraulic Conductivity of Bentonite-Polymer Composite Geosynthetic Clay Liners Under Elevated Temperature and Extreme pH, *Proc. Geosynthetics 2023*, Advanced Textiles Association, Rosemont, MN, 549-560. ☞
- Hou, J., Gustitus, S., and Benson, C. (2022), Pore-Scale Modeling of Polymer Clogging in Bentonite-Polymer Composite Geosynthetic Clay Liners, *Geo-Congress 2022, Soil Improvement, Geosynthetics, and Innovative Geomaterials*, ASCE, GSP No. 331, A. Lemnitzer and A. Stuedlein, eds., 597-604. ☞
- Hou, J., Xing, X., and Benson, C. (2023), Thermo-Hydro-Mechanical Shear Behavior of Interfaces Between a Textured Geomembrane and Geosynthetic Clay Liner, *Geo-Congress 2023, Foundations*,

- Retaining Structures, and Geosynthetics*, ASCE, GSP No. 341, E. Rathje, B. Montoya, and M. Wayne, eds., 545-553. ↵
- Hou, J., Chu, C., and Benson, C. (2024), Evaluating the Impact of Bentonite Granule Size Distribution and Swelling on the Hydraulic Conductivity of Geosynthetic Clay Liners, *Proc. GeoAmericas 2024*, E3S Web of Conferences, 569, 14003, 11 p. ↵
- Hunter, E., Tinjum, J., and Benson, C. (2014), Radionuclide Behavior in Low-Level Radioactive Waste (LLW) Disposal Barrier Materials: Impacts of Sorption, *Geo-Congress 2014, Geo-Characterization and Modeling for Sustainability*, ASCE, GSP No. 234, M. Abu-Farsakh, X. Yu, Ph.D., and L. Hoyos, eds., 1929-1930. ↵
- Khire, M., Benson, C., and Bosscher, P. (1997), Water Balance of Two Earthen Landfill Caps in a Semi-Arid Climate, *Intl. Containment Tech.*, 252-261. ↵
- Khire, M., Meerdink, J., Benson, C., and Bosscher, P. (1995), Unsaturated Hydraulic Conductivity and Water Balance Predictions for Earthen Landfill Final Covers, *Soil Suction Applications in Geotechnical Engineering Practice*, ASCE, GSP No. 48, W. Wray and S. Houston, eds., 38-57. ↵
- Komonweeraket, K., Benson, C., Edil, T., and Bleam, W. (2011), Leaching Behavior and Mechanisms Controlling the Release of Elements from Soil Stabilized with Fly Ash, *GeoFrontiers 2011 Advances in Geotechnical Engineering*, GSP No. 211, J. Han and D. Alazamora, eds., ASCE, Reston, VA, 1101-1110. ↵
- Kootstra, B., Ebrahimi, A., Edil, T., and Benson, C. (2010), Plastic Deformation of Recycled Base Materials, *GeoFlorida 2010, Advances in Analysis, Modeling, and Design*, Geotechnical Special Publication No. 199, D. Fratta, A. Puppula, and B. Muhunthan, eds., ASCE, Reston, VA, 2682-2691. ↵
- Koragappa, N., Wall, R., and Benson, C. (2008), Water Balance Cover – Case Study of a Southern California Landfill, *Proceedings, Global Waste Management Symposium 2008*, Penton Media, Orlando, 1-15.
- Lee, J., Bradshaw, S., Edil, T., and Benson, C. (2010), Green Benefits of Using Coal Ashes for Subgrade Stabilization During Road Construction, *Proc. Second Intl. Conference on Sustainable Construction Materials and Technologies*, Università Politecnica delle Marche, Ancona, Italy. ↵
- Lee, J., Edil, T., Benson, C., and Tinjum, J. (2010), Use of BE²ST-in-Highways for Green Highway Construction in Wisconsin, *Proc. Green Streets and Highways 2010*, ASCE, 480-494. ↵
- Li, L and Benson, C. (2005), Impact of Fouling on the Long-Term Hydraulic Behavior of Permeable Reactive Barriers, *Permeable Reactive Barriers*, Publication 298, International Assoc. of Hydrological Sciences, Oxfordshire, UK, G. Boshoff and B. Bone, eds., 23-32. ↵
- Li, L., Benson, C., Edil, T., and Hatipoglu, B. (2006), WiscLEACH: A Model for Predicting Ground Water Impacts from Fly-Ash Stabilized Layers in Roadways, *Geotechnical Engineering in the Information Technology Age*, D. DeGroot, J. DeJong, J. Frost, and L. Baise, eds., ASCE. ↵
- Li, L., Mergener, E., and Benson, C. (2003), Reactive Transport Modeling of Mineral Fouling in Permeable Reactive Barriers, *Proc. MODFLOW and More 2003: Understanding through Modeling*, International Groundwater Modeling Center, Golden, CO, 300-304. ↵
- Lin, H., Chen, J., Benson, C., and Clark, B. (2020), Sorption of Anionic Iodine and Molybdenum to Multisorbing Barrier (MSB) Materials, *Proc. Waste Management '20*, Phoenix, AZ. ↵
- Malusis, M. and Benson, C. (2006), Lysimeters versus Water-Content Sensors for Performance Monitoring of Alternative Earthen Final Covers, *Unsaturated Soils 2006*, ASCE Geotechnical Special Publication No. 147, 1, 741-752. ↵
- Manassero, M., Benson, C., and Bouazza, M. (2000), Solid Waste Containment Systems, *Proc. GeoEng2000*, Melbourne, Australia, Technomic Publishing Company, Lancaster, PA, USA, 520-642. ↵

- Metz, S. and Benson, C. (2007), Iron Foundry Slags as Permeable Reactive Barrier Materials for Removing Arsenic from Groundwater, *Geoenvironmental Engineering*, Geotechnical Special Publication 163, ASCE, Reston, VA, 1-11. ↵
- Nokkaew, K., Tinjum, J., and Benson, C. (2012), Hydraulic Properties of Recycled Asphalt Pavement and Recycled Concrete Aggregate, *State of the Art and Practice in Geotechnical Engineering*, GSP No. 225, R. Hryciw et al., Eds., ASCE, Reston VA, 1476-1485. ↵
- Norris, A., Scalia, J., Benson, C., and Shackelford, C. (2024), Review of Methods for Quantifying Polymer Loading of Enhanced-Bentonite Geosynthetic Clay Liners, *Geosynthetics: Leading the Way to a Resilient Planet*, *Proc. 12th International Conference on Geosynthetics*, G. Biondi, et al., eds., CRC Press/Balkema, Boca Raton, FL, 1479-1484. ↵
- O'Donnell, J., Benson, C., and Edil, T. (2010), Trace Element Leaching from Pavements with Fly Ash-Stabilized Bases and Subgrades: Experience in the Midwestern United States, *Proc. Second Intl. Conference on Sustainable Construction Materials and Technologies*, Università Politecnica delle Marche, Ancona, Italy.
- O'Donnell, J., Benson, C., Edil, T., and Bradshaw, S. (2011), Leaching of Trace Elements from Pavement Materials Stabilized with Fly Ash, *Proc. Green Streets and Highways 2010*, ASCE, Reston, VA, 272-279. ↵
- Ogorzalek, A., Shackelford, C., and Benson, C. (2005). Comparison of Model Predictions and Field Data for an Alternative Cover in a Semiarid Climate, *Symp. on Mines and the Environment*, Canadian Institute of Mining, Metallurgy, and Petroleum, Montreal, Quebec, 666-680.
- Othman, M., Benson, C., Chamberlain, E., and Zimmie, T. (1994), Laboratory Testing to Evaluate Changes in Hydraulic Conductivity Caused by Freeze-Thaw: State-of-the-Art, *Hydraulic Conductivity and Waste Containment Transport in Soils*, STP 1142, ASTM, S. Trautwein and D. Daniel, eds., 227-254. ↵
- Padgett, J., Breitmeyer, R., Bareither, C., Barlaz, M., and Benson, C. (2008). Biodegradability of Forest Products Under Laboratory and Bioreactor Landfill Conditions, *Proceedings, Global Waste Management Symposium 2008*, Penton Media, Orlando, 1-6.
- Rauen, T. and Benson, C. (2008), Hydraulic Conductivity of a Geosynthetic Clay Liner Permeated with Leachate from a Landfill with Leachate Recirculation, *GeoAmericas 2008*, International Geosynthetics Society. ↵
- Rowe, R. et al. (2022), Protecting the Environment from Contamination with Barrier Systems: Advances and Challenges, *Proc. 20th International Conference on Soil Mechanics and Geotechnical Engineering*, Balkema, Rotterdam, 1-108. ↵
- Salihoglu, H., Chen, J., Likos, W., and Benson, C. (2016), Hydraulic Conductivity of Bentonite-Polymer Geosynthetic Clay Liners in Coal Combustion Product Leachates, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 438-448. ↵
- Santos, M., Chen, J., Gruber, C., van der Sloot, H., Brown, K., Kosson, D., and Benson, C. (2025), Hydrological Evaluation for Disposal of Glass Waste Forms at the Hanford Site, Washington, Washington, *Proc. Waste Management 2024*, WM Symposia Inc., 25113, 1-8. **(Superior Paper Award)** ↵
- Sawangsurriya, A., Edil, T., Benson, C. and Wang, X., A Simple Setup for Inducing Matric Suction, *Third Asian Conference on Unsaturated Soils*, 2007, Nanjing, China. ↵
- Sawangsurriya, A., Benson, C., And Wang, X. (2010), Issues for Calibration of Thermal Dissipation Sensors for Measuring Matric Suction, *Unsaturated Soils*, Buzzi, O., Fityus, S., And Sheng, D., Eds. Taylor And Francis, London, 209-214. ↵

- Scalia, J., Benson, C., Edil, T., Bohnhoff, G., and Shackelford, C. (2011), Geosynthetic Clay Liners Containing Bentonite Polymer Nanocomposite, *GeoFrontiers 2011 Advances in Geotechnical Engineering*, GSP No. 211, J. Han and D. Alazamora, eds., ASCE, Reston, VA, 2001-2009. ☞
- Scalia, J. and Benson, C. (2016), Evaluation of Na-Bentonite-Polyacrylate Mixtures to Enhance the Chemical Resistance of Geosynthetic Clay Liners, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 388-398. ☞
- Scalia, J. and Benson, C. (2014), Barrier Performance of Bentonite-Polyacrylate Nanocomposite to Artificial Ocean Water, *Proc. Geo-Congress 2014, Geo-Characterization and Modeling for Sustainability*, ASCE, GSP 234, M. Abu-Farsakh, X. Yu, and L. Hoyos, eds., 1826-1835. ☞
- Schlicht, P., Benson, C., Tinjum, J., and Albright, W. (2010), In-Service Hydraulic Properties of Two Landfill Final Covers in Northern California, *GeoFlorida 2010, Advances in Analysis, Modeling, and Design*, Geotechnical Special Publication No. 199, D. Fratta, A. Puppula, and B. Muhunthan, eds., ASCE, Reston, VA, 2867-2877. ☞
- Shackelford, C. and Benson, C. (2006), Selected Factors Affecting Water-Balance Predictions for Alternative Covers Using Unsaturated Flow Models, *Geotechnical Engineering in the Information Technology Age*, D. DeGroot, J. DeJong, J. Frost, and L. Baise, eds., ASCE. ☞
- Smesrud, J., Benson, C., Albright, W., Richards, J., Wright, S., Israel, T., and Goodrich, K. (2008), Lessons Learned from an Alternative Cover Pilot Test in Northern California, *Proceedings, Global Waste Management Symposium 2008*, Penton Media, Orlando, 1-20. ☞
- Somasundaram, S., Shenthann, T., Benson, C., and Nannapaneni, S. (2010), Unsaturated Hydraulic Characteristics of Soil with Significant Oversize Particles, *Proc. Fifth Intl. Conference on Unsaturated Soils*, CRC Press, Boca Raton, FL, 494-500. ☞
- Stefani, N., Likos, W., and Benson, C. (2016), Evaluation of Two Methods for Measuring Radon Flux from Earthen Radon Barriers, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 145-155. ☞
- Tachavises, C. and Benson, C. (1997), Flow Rates Through Earthen, Geomembrane, and Composite Cut-off Walls, *Intl. Containment Tech.*, 945-953. ☞
- Tachavises, C. and Benson, C. (1997), Hydraulic Importance of Defects in Vertical Groundwater Cutoff Walls, *In Situ Remediation of the Geoenvironment*, GSP No. 71, J. Evans, ed., ASCE, Reston, VA, 168-180. ☞
- Tan, Y., Basantis, A., Benson, C., and Chen, J. (2022), Hydraulic Properties of Sluiced Coal Combustion Products Disposed in Impoundments, *Geo-Congress 2022: Geoenvironmental Engineering; Unsaturated Soils; and Contemporary Topics in Erosion, Sustainability, and Coal Combustion Residuals*, ASCE, GSP No. 335, A. Lemnitzer and A. Stuedlein, eds., 505-513. ☞
- Tan, Y., Benson, C., Zhang, H. (2022), Interactions Between Geosynthetic Clay Liners and Concrete in Low-Level Radioactive Waste Disposal Facilities, *Proc. Waste Management '22, WM Symposia Inc.*, 22337, 1-7. ☞
- Tan, Y., Chen, J., Benson, C. (2022), Predicting Hydraulic Conductivity of Geosynthetic Clay Liners Using a Neural Network Algorithm, *Geo-Congress 2022: Geoenvironmental Engineering; Unsaturated Soils; and Contemporary Topics in Erosion, Sustainability, and Coal Combustion Residuals*, ASCE, GSP No. 335, A. Lemnitzer and A. Stuedlein, eds., 21-28. ☞
- Tan, Y., and Benson, C. (2023), Effectiveness of Composite Liners in Containing PFAS, *Proc. Waste Management '23*, Phoenix, AZ, 23292, 1-7. ☞
- Tan, Y., Benson, C., Zhou, G., Bradshaw, S., and Edil, T. (2024), Hydraulic Conductivity of Two Geosynthetic Clay Liners with Different Bentonite Granule Sizes, *Proc. GeoAmericas 2024*, E3S Web of Conferences, 569, 14001, 10 p. ☞

- Tan, Y. and Benson, C. (2025), Evaluating Diffusion of Per- and Polyfluoroalkyl Substances through Composite Liners, *Geoenvironmental Engineering*, GSP No. 362, M. Othman and N. Yesiller, eds., ASCE, Reston, VA, 127-137. ↗
- Tanyu, B., Kim, W., Edil, T., and Benson, C. (2003), Comparison of Laboratory Resilient Modulus with Back-Calculated Elastic Moduli from Large-Scale Model Experiments and FWD Tests on Granular Materials, *Resilient Modulus Testing for Pavement Components*, STP 1437, G. Durham, A. Marr, and W. De Groff, eds., ASTM, West Conshohocken, PA, 191-208. ↗
- Tatliso, N., Benson, C., and Edil, T. (1997), Effect of Fines on the Mechanical Properties of Soil-Tire Chip Mixtures, *Testing Soil Mixed with Waste or Recycled Materials*, STP 1275, ASTM, M. Wasmiller and K. Hoddinott, eds., 93-108. ↗
- Tian, K. and Benson, C. (2014), Hydraulic Conductivity of Geosynthetic Clay Liners Exposed to Low-Level Radioactive Waste Leachate, *Proceedings Waste Management '14*, WM Symposia Inc., Phoenix, AZ, 1-15. ↗
- Tian, K. and Benson, C. (2015), Effect of Low-Level Radioactive Waste Leachate on Hydraulic Conductivity of a Geosynthetic Clay Liner, *Geosynthetics 2015*, IFAI, St. Paul, MN, 236-244. ↗
- Tian, K. and Benson, C., Yang, Y., and Tinjum, J. (2016), Effect of Radiation from Low-Level Radioactive Waste Leachate on Antioxidant Depletion in HDPE Geomembranes, Paper No. 16087, *Proceedings Waste Management '16*, WM Symposia Inc., Phoenix, AZ, 1-10. ↗
- Tian, K., Benson, C., and Likos, W. (2017), Effect of an Anion Ratio on the Hydraulic Conductivity of a Bentonite-Polymer Geosynthetic Clay Liner, *Geotechnical Frontiers 2017, Waste Containment, Barriers, Remediation, and Sustainable Geoengineering*, GSP No. 276, ASCE, T. Brandon and R. Valentine, eds., 180-189. ↗
- Tian, K. and Benson, C. (2018), Containing Bauxite Liquor Using Bentonite-Polymer Composite Geosynthetic Clay Liners, *Proc. 8th Intl. Conference on Environmental Geotechnics*, Springer Nature, Singapore, L. Zhan et al. (Eds.): 672-678. ↗
- Tian, K. and Benson, C. (2018), Containing Tc-99 Using a Multisorbing Barrier Material, *Proceedings Waste Management '18*, WM Symposia Inc., Phoenix, AZ, 1-6. ↗
- Tian, K., Benson, C., Yesiller, N., and Hanson, J. (2019), Evaluation of a HDPE Geomembrane from a Composite Liner After 12 Years of Atmospheric Exposure, *Geosynthetics 2019*, Industrial Fabrics Association International, St. Paul, MN, 522-527. ↗
- Tian, K., Likos, W., and Benson, C. (2016), Pore-Scale Imaging of Polymer-Modified Bentonite in Saline Solutions, *Proc. Geo-Chicago 2016: Sustainable Geoenvironmental Systems*, ASCE, GSP 271, A. De, K. Reddy, N. Yesiller, D. Zekkos, and A. Farid, eds., 468-478. ↗
- Tian, K., Tinjum, J., Benson, C., and Edil, T. (2014) Antioxidant Depletion in HDPE Geomembranes Exposed to Low-Level Radioactive Waste Leachate. *Geo-Congress 2014*, 1816-1825, doi: 10.1061/9780784413272.1781-15. ↗
- Trzebiatowski, B., Edil, T., and Benson, C. (2004), Case Study of Subgrade Stabilization Using Fly Ash: State Highway 32, Port Washington, Wisconsin, *Beneficial Reuse of Waste Materials in Geotechnical and Transportation Applications*, GSP No. 127, A. Aydilek and J. Wartman, eds., ASCE, Reston, VA, 123-136. ↗
- Vasko, S., Jo, H., Benson, C., Edil, T., and Katsumi, T. (2001), Hydraulic Conductivity of Partially Prehydrated Geosynthetic Clay Liners Permeated with Aqueous Calcium Chloride Solutions, *Geosynthetics 2001*, Industrial Fabrics Assoc. International, St. Paul, MN, 685-699. ↗
- Wang, X. and Benson, C. (2016), Constant-Head Constant-Volume Hydraulic Conductivity Testing of Porous Materials, *Proc. Geoenvironmental Engineering: Honoring David E. Daniel*, ASCE, GSP 274, C. Benson and C. Shackelford, eds., 69-79. ↗

- Waugh, W., Benson, C., and Albright, W. (2008), Monitoring the Performance of an Alternative Landfill Cover Using a Large Embedded Lysimeter, *Proceedings, Global Waste Management Symposium 2008*, Penton Media, Orlando, 1-10. ↗
- Waugh, W., Benson, C., and Albright, W. (2009), Sustainable Covers for Uranium Mill Tailings, USA: Alternative Design, Performance, and Renovation, *Proc. 12th Intl. Conference on Environmental Remediation and Radioactive Waste Management*, ICEM2009, ASME, 11-15 October 2009, Liverpool, UK. ↗
- Williams, M., Fuhrmann, M., Stefani, N., Michaud, A., Likos, W., Benson, C., and Waugh, W. (2024), Uranium Mill Tailings Radiation Control Act Cover Performance After Nearly 20 Years of Service, *Proc. Waste Management 2024*, WM Symposia Inc., 24621, 1-8. **(Superior Paper Award)** ↗
- Williams, T., Benson, C., Tian, K., Yesiller, N., and Hanson, J., (2018), Hydraulic Conductivity of a Geosynthetic Clay Liner (GCL) from a Composite Liner after 12-yr of Atmospheric Exposure, *Proc. 11th Intl. Conference on Geosynthetics*, IGS, 16-21 Sept. 2018, Seoul, Korea, 1-7. ↗
- Worthy, R., Abkowitz, M., Clarke, J., and Benson, C. (2011), Analysis of Modeling Capabilities to Predict Disposal Facility Cover Design and Performance at DOE Sites, *Proc. Waste Management '11*, WM Symposia Inc., Phoenix, AZ. ↗
- Wright, S., Arcement, B., and Benson, C. (2003), Comparison of Maximum Density of Cohesionless Soils Determined Using Vibratory and Impact Compaction Methods, *Soil and Rock America 2003*, Verlag Gluck auf GMBH, Essen, Germany, 1709-1716. ↗
- Yilmaz, M., Olson, R., Tan, Y., Benson, C., Edil, T., and Bradshaw, S. (2023), Characteristics of Black Goo From Leachate Collection Systems at Two North American Landfills, *Proc. 9th International Congress on Environmental Geotechnics*, Vol. 3., Volume 3, T. Baser et al., ed., International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE), 26-30. ↗
- Zhu, J., Tan, Y., Benson, C., Youngblood, J., Bradshaw, S., and Edil, T. (2024), Using Viscosity as an Index for Polymer Loading of Bentonite-Polymer Composite Geosynthetic Clay Liners, *Proc. GeoAmericas 2024*, E3S Web of Conferences, 569, 14002, 9 p. ↗

Books

- Albright, W., Benson, C., and Waugh, W. (2010), *Water Balance Covers for Waste Containment: Principles and Practice*, ASCE Press, Reston, VA, 158 p. ↗

Chapters in Books & Other Periodicals

- Benson, C. (2005), Materials Stability and Applications, in *Barrier Systems for Environmental Contaminant Containment and Treatment*, C. Chen, H. Inyang, and L. Everett, eds., CRC Press, Boca Raton, FL, 143-208.
- Benson, C. and Scalia, J. (2010), Chapter 10: Hydrologic Performance of Final Covers Containing GCLs, in *Geosynthetic Clay Liners for Waste Containment Facilities*, A. Bouazza and J. Bowders, eds., CRC Press, Boca Raton, FL, 203-211. ↗
- Doyle, M., Lee, S., Benson, C., and Pariza, M. (2010), Decontamination and Disposal of Contaminated Foods, *Wiley Handbook of Science and Technology for Homeland Security*, J. Voeller, ed., John Wiley and Sons, NY, 1-15. ↗
- Li, L. and Benson, C. (2005), Reactive Transport in the Saturated Zone: Case Histories for Permeable Reactive Barriers, *Water Encyclopedia, Volume I – Ground Water*, J. Lehr and J. Keeley, eds., John Wiley, 518-524.

Non-Refereed Conference Papers

- Abichou, T., Albright, W., and Benson, C., (2003). Field Tests of Conventional and Alternative Final Cover Systems for Landfill Final Covers. *SWANA WASTECON 2003 Proc.*, 143-158.

- Abichou, T., Edil, T., Benson, C., Berilgen, M. (2002), Mass Behavior of Soil-Tire Chip Backfills, *Beneficial Use of Recycled Materials in Transportation Applications*, Air and Waste Management Association, Sewickley, PA, 689-698. ☞
- Abu-Hassanein, Z. and Benson, C. (1994), Using Electrical Resistivity for Compaction Control of Compacted Soil Liners, *Proc. Tailings and Mine Waste '94*, Jan. 19-21, Ft. Collins, CO, 177-189. ☞
- Albright, W., Benson, C., Gee, G., Rock, S., and Abichou, T. (2001), Tests of Alternative Final Landfill Covers in Arid and Semi-Arid Areas Using Innovative Water Balance Monitoring Systems, *Proc. 36th Annual Engineering Geology & Geotechnical Engineering Symp.*, 33-41.
- Albright, W., Benson, C., Gee, G., and Rock, S. (2000), Tests of Alternative Final Landfill Covers Using Innovative Water Balance Monitoring Systems, *Proc. Geological Society of America Annual Meeting*, Reno, Nevada, 32(7), 126. ☞
- Benson, C., Edil, T., Bin-Shafique, S. (2007), Leaching of Trace Elements from Soils Stabilized with Coal Fly Ash, *Proc. Flue Gas Desulphurization Byproducts at Coal Mines*, K. Vories and A. Harrington, Eds., US Dept. of Interior Office of Surface Mining Coal Research Center, Carbondale, IL, 101-111. ☞
- Benson, C. (2005), General Report on Technical Session 3a: Waste Disposal and Management, *Proc. 16th Intl. Conference on Soil Mechanics and Geotechnical Engineering*, Japanese Geotechnical Society, Tokyo, 179-185.
- Benson, C., Bohnhoff, G., Apiwantragoon, P., Ogorzalek, A., Shackelford, C., and Albright, W. (2004), Comparison of Model Predictions and Field Data for an ET Cover, *Tailings and Mine Waste '04*, Balkema, Leiden, Netherlands, 137-142. ☞
- Benson, C. (2000), Liners and Covers for Waste Containment, *Proc. Fourth Kansai Intl. Geotechnical Forum, Creation of a New Geo-Environment*, Japanese Geotechnical Society, Kyoto, Japan, 1-40. ☞
- Benson, C. (1999), Final Covers for Waste Containment Systems: A North American Perspective, *Proc. XVII Conference of Geotechnics of Torino, Control and Management of Subsoil Pollutants*, Italian Geotechnical Society, Torino, Italy, 1-32. ☞
- Benson, C. (1999), Environmental Geotechnics in the New Millennium, *Geotechnics for Developing Africa*, G. Wardle, G. Blight, and A. Fourie, Eds., Balkema, Rotterdam, 9-22. ☞
- Benson, C. and Khire, M. (1997), Earthen Materials in Surface Barriers, *Barrier Technologies for Environmental Management*, National Academy Press, National Research Council, D79-D89. ☞
- Benson, C., Olson, M., and Bergstrom, W. (1995), Field Evaluation of Five Landfill Liner Insulations, *Proc. Eighteenth Intl. Madison Waste Conference*, Sept. 23-24, Madison, WI, 309-318. ☞
- Benson, C. (1994), Research Developments in Clay Liner Construction, *Proc. 32nd Annual Intl. Solid Waste Exposition*, Solid Waste Association of North America, Silver Spring, MD, 81-93. ☞
- Benson, C., Chamberlain, E., and A. Erickson (1994), Methods for Assessing Freeze-Thaw Damage in Compacted Soil Liners, *Proc. Seventeenth Intl. Madison Waste Conference*, Madison, WI, Sept. 21-22, 185-197. ☞
- Brown, B., Bradshaw, S., Edil, T., and Benson, C. (2015), Leaching from Roadways Stabilized with Fly Ash: Data Assessment and Synthesis, *Proc., World of Coal Ash (WOCA) Conference*, Center for Applied Energy Research, University of Kentucky, Louisville, 1-10. ☞
- Bohnhoff, G., Shackelford, C., Malusis, M., Scalia, J., Benson, C., Edil, T., Di Emiddio, G., Katsumi, T., and Mazzieri, F. (2013), Novel Bentonites for Containment Barrier Applications, *Proc., 18th Intl. Conference on Soil Mechanics and Geotechnical Engineering-Challenges and Innovations in Geotechnics*, P. Delage et al., eds., Presses des Ponts, Paris, 2997-3000. ☞
- Christman, M., Edil, T., and Benson, C. (1999), Characterization of Well Seals Using an Ultrasonic Method, *Proc. Symp. On Application of Geophysics to Engineering and Environmental Problems*, Environmental and Engineering Geophysics Society, Wheat Ridge, CO, 879-888. ☞

- Benson, C. and Boutwell, G. (1992), Compaction Control and Scale-Dependent Hydraulic Conductivity of Clay Liners, *Proc. of the 15th Intl. Madison Waste Conference*, Madison, WI, Sept. 23-24, 62-83. ☞
- Benson, C., Hardianto, F., Motan, E., and Mussatti, D. (1992), Comparison of Laboratory and In Situ Hydraulic Conductivity Tests on a Full-Scale Test Pad, *Mediterranean Conference on Environmental Geotech.*, Cesme, Turkey, May 25-27, 219-228. ☞
- Benson, C. and Othman, M. (1991), Geotechnical Characteristics of Compacted Municipal Solid Waste Compost, *Proc. of the 34th Annual Meeting of the Association of Engineering Geologists*, Sept. 30-Oct. 4, Chicago, IL, 683-691. ☞
- Benson, C. (1991), Predicting Excursions beyond Regulatory Thresholds of Hydraulic Conductivity Using Quality Control Measurements, *Proc. of the First Canadian Conference on Environmental Geotechnics*, Montreal, May 14-17, 447-454. ☞
- Benson, C. (1990), A Minimum Thickness of Compacted Soil Liners, *of the 13th Annual Madison Waste Conference*, Madison, WI, September 19-20, 395-422. ☞
- Benson, C. (1989), Index Tests for Evaluating the Effect of Leachate on a Soil Liner, *Proc. Second Intl. Symposium on Environmental Geotechnology*, Shanghai, China, 222-228. ☞
- Benson, C., Charbeneau, R., and Daniel, D. (1988), Reliability of Compacted Soil Liners, *Proc. of the National Conference on Hydraulic Engineering*, ASCE, Colorado Springs, Colorado, 564-569. ☞
- Elder, C., Benson, C., Eykholt, G. (2001), Economic and Performance Based Design of Monitoring Systems for PRBs, *Proc. 2001 Intl. Containment and Remediation Conference*, Institute for International Cooperative Environmental Research, Florida State University, Tallahassee, FL, USA, 1-5. ☞
- Erickson, A., Chamberlain, E., and Benson, C. (1994), Effects of Frost Action on Covers and Liners in Cold Environments, *Proc. Seventeenth Intl. Madison Waste Conference*, Madison, WI, Sept. 21-22, 198-220. ☞
- Foose, G., Tachavises, C., Benson, C., and Edil, T. (1998), Analyzing Geoenvironmental Engineering Problems with MODFLOW, *Proc. MODFLOW '98*, Colorado School of Mines, Golden, CO, 1, 81-88. ☞
- Gibson, S., Benson, C., and Edil, T. (1999), Assessing Exploratory Borehole Seals with Electrical Geophysical Techniques, *Proc. Symp. On Application of Geophysics to Engineering and Environmental Problems*, Environmental and Engineering Geophysics Society, Wheat Ridge, CO, 869-878. ☞
- Gulec, S., Benson, C., and Edil, T. (2003), Effects of Acid Mine Drainage (AMD) on the Engineering Properties of Geosynthetics, *Tailings and Mine Waste '03*, Swets & Zeitlinger, Lisse, 173-179. ☞
- Hardianto, F. and Benson, C. (1993), Effect of Specimen Size on Hydraulic Conductivity Measurement of Compacted Soil Liners, *Proceedings ASCE Annual Florida Section Meeting*, Sept. 9-11, Orlando, 1-12. ☞
- Hill, T. and Benson, C. (1999), Hydraulic Conductivity of Compacted Mine Rock Backfill, *Tailings and Mine Waste '99*, Balkema, Rotterdam, 373-379. ☞
- Jo, H., Benson, C., and Edil, T. (2004). Long-Term Hydraulic Conductivity and Cation Exchange of a Geosynthetic Clay Liner (GCL) Permeated with Inorganic Salt Solutions, *Proc. 2004 Annual Conference, Korean Society of Soil and Groundwater Environment*, Jeonju, Korea, 59-62. ☞
- Katsumi, T., Ogawa, A., Numata, S., Benson, C., Kolstad, D., Jo, H., Edil, T., and Fukagawa, R. (2002), Geosynthetic Clay Liners Against Inorganic Chemical Solutions, *Proc. Second Japan-Korea Joint Seminar on Geoenvironmental Engineering*, Kyoto University, Japan, 27-32. ☞
- Katsumi, T., Benson, C., Foose, G., and Kamon, M. (1999), Calculating Chemical Leakage from Landfill Bottom Liners, *Proc. 34th Annual Conference*, Japanese Geotechnical Society, Tokyo.
- Katsumi, T., Benson, C., Jo, H., and Edil, T. (1999), Hydraulic Conductivity of GCLs Permeated with Chemical Solutions, *Proc. 54th Annual Conference*, Japanese Society of Civil Engineers, Tokyo.

- Katsumi, T., Benson, C., Foose, G., and Kamon, M. (1999), Performance-Based Method for Analyzing Landfill Liners, *Geoenvironmental Engineering*, R. Yong and H. Thomas, Eds., British Geotechnical Society, Thomas Telford Publishers, London, 21-28. ☞
- Khire, M., Benson, C., Bosscher, P., and Pliska, R. (1994), Field-Scale Comparison of Capillary and Resistive Landfill Covers in an Arid Climate, *Proc. 14th Annual Hydrology Days*, Fort Collins, CO, 195-209. ☞
- Kim, H. and Benson, C. (1999), Oxygen Transport Through Multilayer Composite Caps Over Mine Waste, *Proc. Sudbury '99 - Mining and the Environment II*, Centre in Mining and Mining Environment Research, Laurentian University, Sudbury, Ontario. ☞
- Kumthekar, U., Chiou, J., Prochaska, M., and Benson, C. (2002), Development of Long-Term Monitoring System to Evaluate Cover System Performance, *Proc. Waste Management '02*, WM Symposia Inc., Tucson, AZ. ☞
- Kumthekar, U., Chiou, J., Prochaska, M., and Benson, C. (2002), Development of Long-Term Monitoring System to Monitor Cover System Conditions, *Spectrum 2002, 9th Biennial Intl. Conference On Nuclear & Hazardous Waste Management*, Reno, Nevada. ☞
- Lane, D., Benson, C., Bosscher, P., and Pliska, R. (1992), Construction and Hydrologic Observations of Three Instrumented Final Covers, *Proc. 15th Intl. Madison Waste Conference*, Madison, Sept. 23-24, 231-250. ☞
- Miller, E., Bahia, H., Benson, C., Khatri A., and Braham, A. (2001), Utilization of Waste Foundry Sand in Hot Mix Asphalt Mixtures, *American Foundry Society Transactions*, 103(1), 1393-1407. ☞
- Motan, E., Benson, C., and Edil, T. (1997), Shear Strength of Municipal Solid Waste, *Proc. WasteTech '97*, National Solid Waste Management Assoc., Washington, DC. ☞
- Ogorzalek, A., Shackelford, C., and Benson, C. (2005). Comparison of Model Predictions and Field Data for an Alternative Cover in a Semiarid Climate. *Symposium on Mines and the Environment*, Rouyn-Noranda, Quebec, Canada, May 15-18, 2005.
- Othman, M. and Benson, C. (1991), Influence of Freeze-Thaw on the Hydraulic Conductivity of a Compacted Clay, *Proc. of the 14th Annual Madison Waste Conference*, Madison, WI, Sept. 25-26, 296-312. ☞
- Rashad, S. and Benson, C. (1994), Improving Subsurface Characterization and Prediction of Contaminant Transport, *Proc., ASCE Annual Hydraulic Engineering Conference*, 277-281. ☞
- Senol, A., Bin-Shafique, M., Edil, T., and Benson, C. (2002), Use of Class C Fly Ash for Stabilization of Soft Subgrade, *Proc. 5th Intl. Congress on Advances in Civil Engineering*, Istanbul Technical University, Istanbul, Turkey, 963-972. ☞
- Simon, D., Alumbaugh, D., and Benson, C. (2001), Quantitative Characterization of an IAS Air Plume Using Geophysics, *Proc. 2001 Intl. Containment and Remediation Conference*, Institute for International Cooperative Environmental Research, Florida State University, Tallahassee, FL, USA, 1-4. ☞
- Waugh, W., Glenn, E., Benson, C., Albright, W., Brusseau, M., Bush, R., and Dayvault, J. (2016), Applications of Ecological Engineering Remedies for Uranium Processing Sites, USA, *Proc. Intl. Conference on Advancing the Global Implementation of Decommissioning and Environmental Remediation Programs*, 23-27 May 2016, Madrid, Spain. ☞
- Waugh, W., Albright, W., and Benson, C. (2007), Alternative Covers: Enhanced Soil Water Storage and Evapotranspiration in the Source Zone, Enhancements to Natural Attenuation: Selected Case Studies, T. Early, Ed., Savannah River National Laboratory, Aiken, SC, 9-15. ☞
- Yesiller, N., Benson, C., Edil, T., and Klima, J. (1997), Assessment of Cased-Borehole Seals Using and Ultrasonic Method, *Proc. Fifth Great Lakes Geotechnical/Geoenvironmental Conference*, Ann Arbor, Michigan, 133-152. ☞

Reviews, Editorials, and Magazine Articles

- Albright, W., Benson, C., G. Gee, Abichou, T., Roesler, A., and Rock, S. (2003), Examining the Alternatives, *Civil Engineering*, 73(1), 70-75. ↵
- Barlaz, M., Benson, C., Castaldi, M., and Luettich, S. (2016), Diagnosing and Understanding Elevated Temperature Landfills, Part 1 - Characteristics and Management Challenges, *Waste360*, Penton Media, New York. ↵
- Barlaz, M., Benson, C., Castaldi, M., and Luettich, S. (2017), Diagnosing and Understanding Elevated Temperature Landfills, Part 2 – Biological Reactions, *Waste360*, Penton Media, New York. ↵
- Barlaz, M., Benson, C., Castaldi, M., and Luettich, S. (2017), Diagnosing and Understanding Elevated Temperature Landfills, Part 3 – Chemical Reactions, *Waste360*, Penton Media, New York. ↵
- Benson, C. (2016), The Future of Environmental Geotechnics: Creating the New Value Proposition, *Environmental Geotechnics*, 3(2), 61-62. ↵
- Benson, C. (2014), Sustainable Water Balance Final Cover for Missoula Landfill, *Montana Solid Waste News*, Summer 2014, Montana Department of Environmental Quality, Helena, MT, 5.
- Benson, C. (2012), The Year Ahead, *Geo-Strata*, November/December, 8.
- Benson, C. (2006), Numerical Modeling in Geoenvironmental Practice, *Geo-Strata*, Aug. 2006. ↵
- Benson, C. (1996), An Overview of Uncertainty '96, *Geotechnical News*, June, 1996.
- Benson, C. and Breitmeyer, R. (2010), Using Inversion to Improve Prediction in Geoenvironmental Engineering, *Geo-Strata*, 14(1), 22-27. ↵
- Benson, C. and Pliska, R. (1996), HELP Needs Help from the Field, *Waste Age*, March 1996. ↵
- Benson, C. and Edil, T. (1995), Using Shredded Scrap Tires in Civil & Environmental Construction, *Resource Recycling*, Oct. 1995. ↵
- Benson, C. (1992), Remotely Monitoring Field-Scale Performance of Final Covers, *Technology Report*, Waste Management, Inc., First Quarter 1992. ↵
- Benson, C. (1990), Waste Geotechnics at the University of Wisconsin-Madison, *Geotechnical News*, December, 1990, 43-46.
- Benson, C. (1990), Review of *Clay Liners for Waste Management Facilities*, *J. of Environmental Quality*, November 1990.
- Bradshaw, S., Benson, C., Edil, T., and Gallagher, B. (2023), Life Cycle Impacts of Harvested Ash in Concrete, *Ash at Work, Applications, Science, and Sustainability of Coal Ash*, Issue 2, 16-19. ↵
- Edil, T. and Benson, C. (2002), Use of Industrial By-Products as Geo-Materials, *Geo-Strata*, April 2002. ↵
- Edil, T. and Benson, C. (2006), Geotechnical Applications of CCPs in Wisconsin, *Ash At Work*, American Coal Ash Association, Summer 2004, 16-20. ↵
- Fox, P. and Benson, C. (2014), Forum Articles and the JGGE, *J. Geotech. Geoenvironmental Eng.*, 01614002-1. ↵
- McCartney, J. and Benson, C. (2011), Laboratory Testing for Unsaturated Soils: A Primer, *Geo-Strata*, 15(2), 19-23. ↵

Reports

- Abichou, T., Benson, C., and Edil, T. (1999), Beneficial Reuse of Foundry Byproducts, Environmental Geotechnics Report 99-1, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Abichou, T., Benson, C., and Edil, T. (1998), Beneficial Reuse of Foundry Sands in Construction of Hydraulic Barrier Layers, Environmental Geotechnics Report 98-2 Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵

- Abichou, T., Benson, C., and Edil, T. (1998), Field Hydraulic Conductivity of Three Test Pads Constructed with Foundry Sands, Environmental Geotechnics Report 98-14, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Acosta, H., Edil, T., and Benson, C. (2003), Soil Stabilization and Drying Using Fly Ash, Geo Engineering Report 03-03, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Albright, W. and Benson, C. (2002), Alternative Cover Assessment Program 2002 Annual Report, Publication No. 41182, Desert Research Institute, Reno, Nevada. ↗
- Bareither, C., Karimi, S., Scalia, J., and Benson, C. (2023), Evaluation and Management of Wet Waste Disposal in Municipal Solid Waste Landfills, Environmental Research and Education Foundation, Raleigh, NC. ↗
- Bareither, C., Barlaz, M., Doran, M., and Benson, C. (2014), Retrospective Analysis of Wisconsin's Landfill Organic Stability Rule: Is the Rule Meeting Its Objectives?, Sustainability Report No. 14-07, Office of Sustainability, University of Wisconsin-Madison, Madison, Wisconsin. ↗
- Bareither, C., Benson, C., Barlaz, M., and Morris, J. (2008), Performance of North American Bioreactor Landfills, Office of Research and Development, US Environmental Protection Agency, Cincinnati, Ohio. ↗
- Bareither, C., Edil, T., and Benson, C. (2007), Determination of Shear Strength Values for Granular Backfill Materials Used by WisDOT, SPR No. 0092-05-08, Wisconsin Highway Research Program, Madison, WI. ↗
- Bazzell, D., Benson, C., Cancian, M., Drinkwater, N., Goldman, I., Gunther, A., Lewis, J., May, K., Meinholz, L., Radomski, N., Seshadri, A., Underwood, J., Warfield, T., Gustafson, A., Norris, T., and Hildebrand, S. (2014), University of Wisconsin-Madison Budget Allocation Model Past, Present and Possibilities, Report to the Chancellor, Budget Model Review Committee, University of Wisconsin-Madison. ↗
- Benson, C. (2021), Water Flow in Coal Combustion Products and Drainage of Free Water, Technical Brief 3002021963, Electric Power Research Institute, Palo Alto, CA. ↗
- Benson, C. (2019), White Paper: Strategies for Containment at Coal Combustion Product Facilities, Report to Electric Power Research Institute, Palo Alto, CA. ↗
- Benson, C. and Benavides, J. (2018), Geochemical Assessment of Long-Term Leachate Quality and Impacts of Wastewater Management Practices at Coal Combustion Product (CCP) Storage Facilities – Progress Summary, Report No. GENV-18-09, School of Engineering, University of Virginia. ↗
- Benson, C. and Gustitus, S. (2018), Predicting Long-Term Percolation from the SDF Closure Cap, Report No. GENV-18-05, School of Engineering, University of Virginia. ↗
- Benson, C. and Tan, Y. (2023), Data Summary Report: Hydraulic Conductivity of Bentonite-Polymer Composite (BPC) Geosynthetic Clay Liners Permeated with an Acidic Copper Heap Leach Solution, Report No. WGL-23-16, Wisconsin Geotechnics Laboratory, University of Wisconsin-Madison. ↗
- Benson, C., Tan, Y., Benavides, J. (2022), Hydrologic Analysis of Disposal Basins for Coal Combustion Products, Report No. 3002023682, Electric Power Research Institute (EPRI), Palo Alto, CA. ↗
- Benson, C. and Tian, K. (2018), Stress-Induced Porewater Pressures in the Vadose Zone Beneath the Environmental Management Waste Management Facility, Report No. GENV-18-09, School of Engineering, University of Virginia. ↗
- Benson, C., Brown, B., Edil, T., and Bradshaw, S., (2015), Leaching from Roadway Substructures Constructed with Coal Combustion Products, Report No. 3002006091, Electric Power Research Institute (EPRI), Palo Alto, CA. ↗

- Benson, C., Chen, J., and Edil, T. (2014), Engineering Properties of Geosynthetic Clay Liners Permeated with Coal Combustion Product Leachates, Report No. 3002003770, Electric Power Research Institute (EPRI), Palo Alto, CA. ☞
- Benson, C., Chen, J., Edil, T., and Likos, W. (2016), Hydraulic Conductivity of Compacted Soil Liners Permeated with Coal Combustion Product Leachates, Report No. 3002008482, Electric Power Research Institute (EPRI), Palo Alto, CA. ☞
- Benson, C., Albright, W., Fratta, D., Tinjum, J., Kucukkirca, E., Lee, S., Scalia, J., Schlicht, P., and Wang, X. (2011), Engineered Covers for Waste Containment: Changes in Engineering Properties & Implications for Long-Term Performance Assessment, NUREG/CR-7028, Office of Research, U.S. Nuclear Regulatory Commission, Washington. ☞ Appendix ☞
- Benson, C., Edil, T., Lee, J., and Bradshaw, S. (2010), Quantifying the Benefits of Using Coal Combustion Products in Sustainable Construction, Report No. 1020552, Electric Power Research Institute (EPRI), Palo Alto, CA. ☞
- Benson, C. and Oren, A. (2009), Factors Contributing to Excessive Leakage from a Waste Water Lagoon in Heber Valley, Utah, Geo Engineering Report No. 09-32, University of Wisconsin, Madison, Wisconsin. ☞
- Benson, C., Lee, S., and Oren, A. (2008), Evaluation of Three Organoclays for an Adsorptive Barrier to Manage DNAPL and Dissolved-Phase Polycyclic Aromatic Hydrocarbons (PAHs) in Ground Water, Geo Engineering Report No. 08-24, University of Wisconsin, Madison, Wisconsin. ☞
- Benson, C. (2008), On-Site Disposal Facilities for Department of Energy Sites: Current Status and Future Implications, Independent Technical Review Committee, US Department of Energy, Washington, DC. ☞
- Benson, C., Abichou, T., Wang, X., Gee, G., and Albright, W. (1999), Test Section Installation Instructions – Alternative Cover Assessment Program, Environmental Geotechnics Report 99-3, Dept. of Civil & Environmental Engineering, University of Wisconsin-Madison. ☞
- Benson, C., Albright, W., Ray, D., and Smegal, J. (2008), Review of the Environmental Management Waste Management Facility at Oak Ridge, Independent Technical Review Committee, US Department of Energy, Washington, DC. ☞
- Benson, C., Albright, W., Ray, D., and Smegal, J. (2008), Review of Issues Associated with the Proposed On-Site Waste Disposal Facility (OSWDF) at Portsmouth, Independent Technical Review Committee, US Department of Energy, Washington, DC. ☞
- Benson, C., Albright, W., Ray, D., and Smegal, J. (2008), Review of Proposed On-Site Disposal Facility at the Paducah Gaseous Diffusion Plant, Independent Technical Review Committee, US Department of Energy, Washington, DC. ☞
- Benson, C., Albright, W., Ray, D., and Smegal, J. (2008), Review of Disposal Practices at the Nevada Test Site, Independent Technical Review Committee, US Department of Energy, Washington, DC. ☞
- Benson, C., Albright, W., Ray, D., and Smegal, J. (2008), Review of Disposal Practices at the Savannah River Site, Independent Technical Review Committee, US Department of Energy, Washington, DC. ☞
- Benson, C., Albright, W., and Ray, D. (2007), Evaluating Operational Issues at the Environmental Restoration Disposal Facility at Hanford, Independent Technical Review Committee, US Department of Energy, Washington, DC.
- Benson, C., Albright, W., Ray, D., and Smegal, J. (2007), Review of the Idaho CERCLA Disposal Facility (ICDF) at Idaho National Laboratory, Independent Technical Review Committee, US Department of Energy, Washington, DC. ☞

- Benson, C., Albright, W., Wang, X., and MacDonald, E. (2006), Assessment of the ACAP Test Sections at Kiefer Landfill: Hydraulic Properties and Geomorphology, Geo Engineering Report No. 02-16, University of Wisconsin, Madison, Wisconsin. ↗
- Benson, C., Barlaz, M., Lane, D., and Rawe, J. (2003), State-of-the-Practice Review of Bioreactor Landfills, Geo Engineering Report 03-05, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C., Kucukkirca, I., and Scalia, J. (2008), Properties of Geosynthetics Exhumed from the Seven Mile Creek Landfill Eau Claire, Wisconsin, Geo Engineering Report No. 08-22, University of Wisconsin, Madison, Wisconsin. ↗
- Benson, C., Lee, S., Wang, X., Albright, W., and Waugh, W. (2008), Hydraulic Properties and Geomorphology of the Earthen Component of the Final Cover at the Monticello Uranium Mill Tailings Repository, Geological Engineering Report No. 08-04, University of Wisconsin, Madison, Wisconsin. ↗
- Benson, C. and Wang, X. (1998), Soil Water Characteristic Curves for Solid Waste, Environmental Geotechnics Report 98-13, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C., Waugh, W., Albright, W., and Smith, G. (2013), Cover Performance Enhancement Tests at the Grand Junction, Colorado Disposal Site: Construction Documentation, Material Testing, and Instrument Calibration, Report LMS/GRJ/S07112, Office of Legacy Management, US Department of Energy. ↗
- Benson, C., Albrecht, B., Motan, E., and Querio, A. (1998), Equivalency Assessment for an Alternative Final Cover Proposed for the Greater Wenatchee Regional Landfill and Recycling Center, Environmental Geotechnics Report 98-6, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. (1998), Comparison of the Effectiveness of Prescriptive and Alternative Covers: Mead Paper, Escanaba, Michigan, Environmental Geotechnics Report 98-13 Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. (1997), A Review of Alternative Landfill Cover Demonstrations, Environmental Geotechnics Report 97-1, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. and Hill, T. (1997), Results of Field Hydraulic Conductivity Tests Conducted on Mine Backfill: Flambeau Mine, Environmental Geotechnics Report 97-4, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. and Wang, X. (1997), Assessment of Green Sands from Wagner Castings Co. as Barrier Materials for Landfill Covers, Environmental Geotechnics Report 97-8, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C., Bosscher, P., and Jong, D. (1997), Predicting Seasonal Changes in Pavement Stiffness and Capacity Caused by Freezing and Thawing, Geotechnical Engineering Report 97-9, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. and Wang, X. (1996), Field Hydraulic Conductivity Assessment of the NCASI Final Cover Test Plots, Environmental Geotechnics Report 96-9, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. (1996), Final Cover Hydrologic Evaluation - Project Summary, Environmental Geotechnics Report 96-4, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↗
- Benson, C. (1994), Assessment of Air Permeability and Freeze-Thaw Resistance of Soils Proposed for Use in the Final Cover at Greater Wenatchee Regional Landfill, Environmental Geotechnics

- Report 94-3, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. and Rashad, S. (1994), Using Co-Kriging to Enhance Hydrogeologic Characterization, Final Report-Year 2, Environmental Geotechnics Report 94-1, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Benson, C., Khire, M., and Bosscher, P. (1993), Final Cover Hydrologic Evaluation: Phase II - Final Report, Environmental Geotechnics Report 93-4, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Benson, C. and Bosscher, P. (1992), Effect of Winter Exposure on the Hydraulic Conductivity of a Test Pad, Environmental Geotechnics Report 92-8, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. (1992), Comparison of In Situ and Laboratory Measurements of Hydraulic Conductivity on a Test Pad with Construction Defects, Environmental Geotechnics Report 92-7, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C., Zhai, H., and Rashad, S. (1992), Assessment of Construction Quality Control Measurements and Sampling Frequencies for Compacted Soil Liners, Environmental Geotechnics Report 92-6, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Benson, C. and Khire, M. (1992), Soil Reinforcement with Strips of Reclaimed HDPE, Environmental Geotechnics Report 92-5, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. and Hardianto, F. (1992), Hydraulic Conductivity Assessment of Compacted Soil Liners: Phase I-Final Report, Environmental Geotechnics Report 92-4, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Benson, C. and Cooper, S. (1992), Reducing Uncertainty in Hydraulic Conductivity Using Soil Classifications from the Cone Penetrometer - Progress Report for First Quarter of Work, Environmental Geotechnics Report 92-2, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. and Lane, D. (1992), Final Cover Hydrologic Evaluation - Review of First Quarter of Work, Environmental Geotechnics Report No. 92-1, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. (1991), Quality Assurance and Hydraulic Conductivity Assessment - Review of First Six Months Work, Environmental Geotechnics Report No. 91-6, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. (1991), Hydrologic Analysis of a Co-Composter Landfill Cell, Environmental Geotechnics Report No. 91-4, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Benson, C. and Othman, M. (1991), Effect of Freeze-Thaw on the Hydraulic Conductivity of Compacted Clay, Environmental Geotechnics Report No. 91-3, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Benson, C. (1991), Minimum Thickness of Compacted Soil Liners, Environmental Geotechnics Report No. 91-2, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Benson, C. (1989), A Stochastic Analysis of Water and Chemical Flow in Compacted Soil Liners, Ph.D. Dissertation, University of Texas at Austin, Austin, Texas, 246 p.
- Benson, C. (1987), A Comparison of In Situ and Laboratory Measurements of Hydraulic Conductivity, Geotechnical Engineering Report 87-2 and M.S. Thesis, University of Texas at Austin, 80 p.

- Bin-Shafique, S., Edil, T., Benson, C., and Senol, A. (2003), Incorporating a Fly Ash Stabilized Layer into Pavement Design – Case Study, Geo Engineering Report 03-04, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Bin-Shafique, S., Benson, C., and Edil, T. (2002), Leaching of Heavy Metals from Fly Ash Stabilized Soils Used in Highway Pavements, Geo Engineering Report 02-14, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Bolen, M., Roesler, A., Benson, C., and Albright, W. (2001), Alternative Cover Assessment Program: Phase II Report, Geo-Engineering Report No. 01-10, University of Wisconsin, Madison, WI. ↵
- Bosscher, P., Jong, D., and Benson, C. (1998), User's Guide for UW Frost, Geotechnical Engineering Report 98-11 Dept. of Civil and Environmental Engineering, Univ. of Wisconsin-Madison. ↵
- Bradshaw, S. and Benson, C. (2011), Effect of Cation Exchange During Subgrade Hydration and Municipal Solid Waste Leachate Permeation on the Hydraulic Conductivity of Geosynthetic Clay Liners, Geotechnics Report 11-9, University of Wisconsin, Madison, WI. ↵
- Bradshaw, S., Benson, C., and Edil, T. (2023), Harvested Coal Ash Used as a Cement Replacement in Concrete: Life Cycle Impacts, Report No. 3002024165, Electric Power Research Institute, Palo Alto, CA. ↵
- Camargo, F., Edil, T., Benson, C., and Martono, W. (2008), In Situ Stabilization of Gravel Roads with Fly Ash, Geo-Engineering Report No. 08-25, University of Wisconsin, Madison, WI. ↵
- Chamberlain, E., Erickson, A., and Benson, C. (1997), Frost Resistance of Cover and Liner Materials for Landfills and Hazardous Waste Sites, Report 97-29, US Army Cold Regions Research and Engineering Laboratory, Hanover, NH. ↵
- Chen, J. and Benson, C. (2023), Leachate Generation Rates for Coal Combustion Product Landfills - Effects of Climate, Size, Placement, and Final Cover, Report No. 3002027198, Electric Power Research Institute, Palo Alto, CA. ↵
- Christman, M., Edil, T., Benson, C., and Riewe, T. (1999), Field Evaluation of Annular Well Seals, Environmental Geotechnics Report 99-2, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Cooper, S. and Benson, C. (1993), An Evaluation of How Subsurface Characterization Using Soil Classifications Affects Predictions of Contaminant Transport, Environmental Geotechnics Report 93-1, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Dingrando, J., Benson, C., and Edil, T. (1999), Beneficial Reuse of Foundry Sand in Controlled Low-Strength Material, Environmental Geotechnics Report 99-5 Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Edincliler, A., Benson, C., and Edil, T. (1996), Shear Strength of Municipal Solid Waste, Environmental Geotechnics Report 96-2, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Edil, T. and Benson, C. (2002), Compatibility of Containment Systems with Mine Waste Liquids, Report No. WRI GRR 01-09, Water Resources Institute, University of Wisconsin-Madison. ↵
- Elder, C., Benson, C., and Eykholt, G. (1998), Air Plume Conceptualization and Mass Transfer Modeling for In Situ Air Sparging, Environmental Geotechnics Report 98-3, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵
- Foose, G., Benson, C., Edil, T. (1996), Methods for Evaluating the Effectiveness of Landfill Liners, Environmental Geotechnics Report 96-10, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Foose, G., Benson, C., and Edil, T. (1995), Evaluating the Effectiveness of Landfill Liners, Environmental Geotechnics Report 95-4, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ↵

- Foose, G., Benson, C., and Bosscher, P. (1993), Shear Strength of Sand Reinforced with Shredded Waste Tires, Environmental Geotechnics Report 93-2, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Fuhrmann, M., Benson, C. Waugh, J., Williams, M., and Arlt, H. (2019), Proceedings of the Radon Barriers Workshop, NUREG/CP-0312, Office of Nuclear Regulatory Research, US Nuclear Regulatory Commission, Washington. ☞
- Gibson, S., Edil, T., and Benson, C. (1999), Assessing Exploratory Borehole Seals with Electrical Geophysical Techniques, Environmental Geotechnics Report 99-4 Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Goodhue, M., Edil, T., and Benson, C. (1998), Reuse of Foundry Sands in Reinforced Earth Structures, Environmental Geotechnics Report 98-16, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Grasso, D., Benson, C., Carrico, A., Chandran, K., Clough, G., Crittenden, J., Greenbaum, D., Hamburg, S., Harmon, T., Hughes, J., Jones, K., Marr, L., Perciasepe, R., Polasky, S., Savitz, M., Scott, N., Trussell, R., and Zimmerman, J. (2018), Environmental Engineering for the 21st Century Addressing the Grand Challenges, Consensus Study Report, National Academies Press, Washington, DC. ☞
- Gurdal, T., Benson, C., and Albright, W. (2003), Hydrologic Properties of Final Cover Soils from the Alternative Cover Assessment Program, Geo Engineering Report 03-02, Geo Engineering Program, University of Wisconsin-Madison. ☞
- Hensel, B., Benson, C., Bittner, A., and Kondziolka, J. (2019), Relative Liner Performance for Coal Combustion Product Management Sites - Conceptual Review and Model Evaluation for Surface Impoundments, Report No. 3002016498, Electric Power Research Institute, Palo Alto, CA. ☞
- IAEA (2023), Technical Aspects Related to the Design and Construction of Engineered Containment Barriers for Environmental Remediation, Technical Reports Series No. 493, International Atomic Energy Agency, Vienna. ☞
- Khire, M., Benson, C. and Bosscher, P. (1994), Final Cover Hydrologic Evaluation, Phase III Report, Environmental Geotechnics Report 94-4, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Kim, K. and Benson, C. (2002), Water Content Calibrations for Final Cover Soils, Geo Engineering Report 02-12, Geo Engineering Program, University of Wisconsin-Madison. ☞
- Kleven, J., Edil, T., and Benson, C. (1998), Mechanical Properties of Excess Foundry Sand for Roadway Subgrade, Environmental Geotechnics Report 98-1 Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Klima, J., Edil, T., and Benson, C. (1996), Field Assessment of Monitoring and Water Supply Well Seals, Environmental Geotechnics Report 96-11, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Kosson, D., Salisbury, J., Powers, C., Benson, C., Bliss, L., Brown, K., Burger, J., Burkhardt, B., Clarke, J., Fyffe, L., Gochfeld, M., Higley, K., Hornberger, G., Jones, K., Krahn, S., LeBoeuf, E., Mayer, H., Stewart, R., and Turner, H. (2018), Hanford Site-Wide Risk Review Project - Final Report, Submitted to Department of Environmental Management, US Department of Energy, by Consortium for Risk Evaluation with Stakeholder Participation, Vanderbilt University, Nashville, TN. ☞
- Kosson, D., Garrabrants, A., Wang, X., Qui, Q., Chen, Z., DeLapp, R., van der Sloot, H., Benson, C., Chen, J., and Benavides, J. (2020), Leaching, Geotechnical, and Hydrologic Characterization of Coal Combustion Products from a Closed Coal Ash Impoundment, Report No. 3002017363, Electric Power Research Institute (EPRI), Palo Alto, CA. ☞

- Kraus, J. and Benson, C. (1994), Effect of Freeze-Thaw on the Hydraulic Conductivity of Three Paper Mill Sludges: Laboratory and Field Evaluation, Environmental Geotechnics Report 94-6, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Kraus, J. and Benson, C. (1994), Laboratory and Field Evaluation of the Effect of Freeze-Thaw on the Hydraulic Conductivity of Barrier Materials, Environmental Geotechnics Report 94-5, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Lane, D., Benson, C., and Bosscher, P. (1992), Hydrologic Observations and Modeling Assessments of Landfill Covers: Phase I-Final Report, Environmental Geotechnics Report 92-10, Department of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Lau, A., Edil, T., and Benson, C. (2001), Use of Geocells in Flexible Pavements Over Poor Subgrades, Geo Engineering Report 01-05, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Lee, T. and Benson, C. (2002), Using Waste Foundry Sands as Reactive Media in Permeable Reactive Barriers, Geo Engineering Report 02-01, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Li, L., Benson, C. and Edil, T. (2005), Assessing Groundwater Impacts from Coal Combustion Products Used in Highways, Geo Engineering Report No. 05-22, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Li, L., Eykholt, G., and Benson, C. (2001), Groundwater Modeling: Semi-Analytical Approaches for Heterogeneity and Reaction Networks, Groundwater Research Report WRI GRR 01-10, Water Resources Institute, University of Wisconsin-Madison. ☞
- Maxwell, S., Kim, W., Edil, T., and Benson, C. (2005), Effectiveness of Geosynthetics in Stabilizing Soft Subgrades, Report 0092-45-15, Wisconsin Highway Research Program, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Meer, S. and Benson, C. (2004), In-Service Hydraulic Conductivity of GCLs in Landfill Covers, Geo Engineering Report 04-17, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Meerdink, J. and Benson, C. (1994), Unsaturated Hydraulic Conductivity of Two Compacted Barrier Soils, Environmental Geotechnics Report 94-6, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Mengelt, M., Edil, T., and Benson, C. (2000), Reinforcement of Flexible Pavements Using Geocells, Geo Engineering Report 00-4, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Nelson, M. and Benson, C. (2002), Laboratory Hydraulic Conductivity Testing Protocols for Paper Industry Residuals Used for Hydraulic Barrier Layers, Technical Bulletin No. 848, National Council for Air and Stream Improvement, Research Triangle Park, NC. ☞
- Nelson, M. and Benson, C. (2002), Laboratory Hydraulic Conductivity Testing Protocols for Paper Sludges Used for Hydraulic Barriers, Geo Engineering Report 02-02, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Palmer, B., Benson, C., and Edil, T. (1997), Class F Fly Ash as a Barrier Material: Laboratory and Field Evaluation, Environmental Geotechnics Report 97-6, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Roesler, A., Benson, C., and Albright, W. (2002), Field Hydrology and Model Predictions for Final Covers in the Alternative Cover Assessment Program – 2002, Geo Engineering Report 02-08, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Russell, J., Benson, C. and Jeljeli, M. (1990), Use of Monte Carlo Techniques to Enhance Qualifier-1 Contractor Prequalification Model, Technical Report No. 102, Construction Engineering and

- Management Program, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Samuelson, M. and Benson, C. (1997), Predicting Frost Depths Beneath Flexible Roadways Using a Thermal Model, Environmental Geotechnics Report 97-5, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Sauer, J., Benson, C. and Edil, T. (2005), Metals Leaching from Highway Test Sections Constructed with Industrial Byproducts, Geo Engineering Report No. 05-21, Departmental of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Sauer, J., Benson, C. and Edil, T. (2005), Leaching of Heavy Metals from Organic Soils Stabilized with High Carbon Fly Ash, Geo Engineering Report No. 05-01, Departmental of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Smith, C. and Benson, C. (2016), Influence of Coupling Erosion and Hydrology on the Long-Term Performance of Engineered Surface Barriers, NUREG/CR-7200, Office of Research, US Nuclear Regulatory Commission, Washington, DC. ☞
- Tatliso, N., Edil, T., Benson, C., Park, J., and Kim, J. (1996), Review of Environmental Suitability of Scrap Tires, Environmental Geotechnics Report 96-7, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Trast, J. and Benson, C. (1993), Hydraulic Conductivity of Thirteen Compacted Clays, Environmental Geotechnics Report 93-3, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.
- Williams, M., Fuhrmann, M., Stefani, N., Michaud, A., Likos, W., Benson, C., and Waugh, W. (2022), Evaluation of In-Service Radon Barriers over Uranium Mill Tailings Disposal Facilities, NUREG/CR-7288, Office of Research, US Nuclear Reg. Comm., Washington, DC. ☞ Appx. ☞
- Yesiller, N., Edil, T., and Benson, C. (1994), Ultrasonic Evaluation of Cased Borehole Seals, Environmental Geotechnics Report 94-8, Dept. of Civil and Environmental Engineering, University of Wisconsin-Madison. ☞
- Yesiller, N., Edil, T., and Benson, C. (1994), Verification Technique to Evaluate the Integrity of Well Seals, Environmental Geotechnics Report 94-2, Department of Civil and Environmental Engineering, University of Wisconsin-Madison.

Standards

- Benson, C. (2011), Standard D 6391, Standard Test Method for Field Measurement of Hydraulic Conductivity Using Borehole Infiltration, *Annual Book of Standards*, ASTM Intl., 04.09.
- Benson, C. (2007), Standard D 7243, Standard Guide for Measuring the Saturated Hydraulic Conductivity of Paper Industry Sludges, *Annual Book of Standards*, ASTM Intl., 04.09.
- Benson, C., Wang, X. and Kim, H. (2007), Standard D 6836, Test Methods for Determination of the Soil Water Characteristic Curve for Desorption Using a Hanging Column, Pressure Extractor, Chilled Mirror Hygrometer, and/or Centrifuge, *Annual Book of Standards*, ASTM Intl., 04.09.
- Bradshaw, S., Scalia, J., Benson, C., and Rauen, T. (2010), Standard D 7503, Standard Test Method for Measuring the Exchange Complex and Cation Exchange Capacity of Inorganic Fine-Grained Soils, *Annual Book of Standards*, ASTM Intl., 04.09.
- Daniel, D. and Benson, C. (2002), Standard D 5856, Test Method for Measurement of Hydraulic Conductivity of Porous Material Using a Rigid-Wall Compaction Mold Permeameter, *Annual Book of Standards*, ASTM Intl., 04.09. Originally approved 1995, Revised 2002.
- Ladd, R. and Benson, C. (2000), Standard D 5084, Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter, *Annual Book of Standards*, ASTM Intl., 04.09. Extensive revision in 2000 by R. Ladd and C. Benson. Originally developed by J. Dunn and D. Daniel.

Yesiller, N., Shackelford, C., and Benson, C. (2005), Standard D 7100, Standard Test Method for Hydraulic Conductivity Compatibility Testing of Soils with Aqueous Solutions that may Alter Hydraulic Conductivity, *Annual Book of Standards*, ASTM Intl., 04.09.

SPONSORED RESEARCH

Environmental Containment Systems

Field and Laboratory Assessment of the Radon Barrier at the Mexican Hat, Utah Disposal Site, US Department of Energy, Office of Legacy Management, with W. Likos.

Understanding, Managing, and Preventing Clogging of Landfill Systems with Black Sticky Material, Environmental Research and Education Foundation.

Effectiveness of Landfill Liners to Control Transport of PFAS in Leachate, Environmental Research and Education Foundation.

Spatial and Temporal Correlation Between Physical and Chemical Odor Measurements and Odor Complaints, Advanced Disposal Services, with A. Benson.

Evaluation and Management of High-Moisture Waste Disposal in Municipal Solid Waste Landfills, Environmental Research and Education Foundation, with J. Scalia and C. Bareither (Colorado State University).

Geochemical Assessment of Long Term Leachate Quality and Impacts of Wastewater Management Practices at Coal Combustion Product (CCP) Disposal Facilities, Electric Power Research Institute, with D. Kosson (Vanderbilt University).

Water Balance Analysis and Data Quality Assurance Assessment for Monticello and Grand Junction Disposal Cell Lysimetry, Navarro Corporation and US Department of Energy.

Service Life of Bentonite-Polymer Geosynthetic Clay Liners, CETCO, Inc.

Behavior of Bentonite-Polymer Geosynthetic Clay Liners Permeated with Aggressive Leachates, CETCO, Inc., with W. Likos.

Evaluating the Long-Term Performance of the SDF Closure Cap, Savannah River Remediation, Inc. and US Department of Energy.

Understanding and Predicting Temperatures in Municipal Solid Waste Landfills, Environmental Research and Education Foundation, with M. Barlaz, NC State University.

Evaluating Effectiveness of Surface Covers for Controlling Water and Radon Fluxes at Uranium Mill Tailings Disposal Facilities, US Nuclear Regulatory Commission, with W. Likos.

Behavior of Polymer-Modified Bentonites Contacted with Aggressive Leachates, Colloid Environmental Technologies Corporation, with W. Likos.

Compatibility of Compacted Clay Liners and Leachate from CCP Containment Facilities, Electric Power Research Institute.

Compatibility of Geosynthetic Clay Liners and Leachate from CCP Containment Facilities, Electric Power Research Institute.

Bench-Scale Comparison of EVOH and HDPE Geomembranes as Barriers to VOC and Methane Emissions, Kuraray America Inc.

Consortium for Risk Evaluation and Stakeholder Participation, US Department of Energy, with Vanderbilt University, Rutgers University, New York University, Oregon State University, University of Pittsburgh, Howard University, University of Arizona, Robert Wood Johnson Medical School.

Coupling Effects of Erosion and Hydrology on the Long-Term Performance of Engineered Surface Barriers, US Nuclear Regulatory Commission

Predicting the Long-Term Performance of Surface Barriers for LLRW Containment, US Department of Energy, Consortium for Risk Evaluation with Stakeholder Participation

Effectiveness of Engineered Covers: From Modeling to Performance Monitoring, US Nuclear Regulatory Commission

Bentonite-Polymer Nanocomposites for Geoenvironmental Applications, National Science Foundation, with T. Edil and C. Shackelford

Prion Transport in Porous Media: Influence of Electrostatic and Non-DLVO Interactions, National Science Foundation, with J. Pedersen and J. Aiken

Effect of Stress, Hydration, and Ion Exchange on the Hydraulic Conductivity of Geosynthetic Clay Liners, Colloid Environmental Technologies Corporation

Innovative Methods for Natural Restoration of Final Covers for Mill Tailings, US Dept. of Energy, with W. Albright and J. Waugh

Evaluating Long-Term Impacts on Final Covers - Exhumation of the ACAP Test Sections, National Science Foundation, US Environmental Protection Agency, Environmental Research and Education Foundation, with D. Fratta and W. Albright

Toxin/Pathogen Inactivation and Disposal of Intentionally Contaminated Foods, National Center for Food Protection and Defense, US Dept. of Homeland Security, with D. Noguera

Predictive Tools for Sustainable Solid Waste Management Using Bioreactor Landfills, National Science Foundation, with M. Barlaz (*Bioreactor Partnership*)

The State of Municipal Solid Waste Bioreactor Landfills-II, US Environmental Protection Agency, with M. Barlaz

VOC Transport Through Composite Landfill Liners, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

VOC Transport in Lined Containment Facilities, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

Hydrology of the Monticello Water Balance Cover, Stoller Corporation and US Dept. of Energy.

Effect of Freeze Thaw on Compacted Soil Liners and Covers, University of Wisconsin Graduate School.

Fate and Transport of Chronic Waste Disease Prions in Municipal Solid Waste Landfills, US Environmental Protection Agency, with J. Pedersen and J. Aiken.

Evaluation of VOC Contamination of Groundwater from Lined Landfills in Wisconsin, Groundwater Research Advisory Council, State of Wisconsin.

Hydrologic Modeling of Covers Used for Mine Waste Containment, US Environmental Protection Agency, with C. Shackelford.

Bioreactor Landfills: State of the Practice, US Environmental Protection Agency, with D. Lane and M. Barlaz.

Field Performance of Alternative Covers, US Environmental Protection Agency.

Integrated Long-Term Stewardship for Low-Level Radioactive Waste, US Department of Energy and Flour Fernald, Fernald, Ohio.

Chemical Interactions Between Mine Waste Liquids and Geosynthetics, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

Long-term Chemical Compatibility of Geosynthetic Clay Liners, National Science Foundation, with C. Shackelford.

Hydraulic Conductivity Testing Protocols for Paper Sludges, National Council of the Pulp and Paper Industry for Air and Stream Improvement.

Dry Barriers for Waste Containment, National Science Foundation, with S. Kung

Alternative Cover Assessment Program, United States Environmental Protection Agency, with W. Albright (Desert Research Institute) and Glendon Gee (Battelle PNNL).

Large-Scale Verification of a VOC Transport Model for Composite Liners, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

Field Assessment of Geosynthetic Clay Liners in Final Covers, United States Environmental Protection Agency.

Unsaturated Hydraulic Properties of Alternative Cover Soils, Waste Management, Waste Connections, Bluestem Solid Waste Authority, and Marina Solid Waste Management District

Alternative Covers for Waste Containment in Southern California, San Bernardino County, CA.

Equivalency of Subtitle D and Alternative Earthen Covers, City of Glendale, Arizona.

Development of *Win*UNSAT-H, a Windows Implementation of UNSAT-H, WMX Technologies.

Hydraulic Characterization of Mine Rock Backfill for the Flambeau Mine, Flambeau Mining Company, Ladysmith, WI

Hydraulic Characterization of Mine Rock Backfill for the Flambeau Mine: II-In Situ Verification, Flambeau Mining Company, Ladysmith, WI

Field Hydraulic Conductivity Assessment of the NCASI Test Plots, National Council of the Paper Industry for Air and Stream Improvement

Effect of Freeze-Thaw on the Hydraulic Conductivity of Compacted Papermill Sludge, the National Council of the Paper Industry for Air and Stream Improvement.

Engineering Properties of Paper Sludges Used for Hydraulic Barriers in Landfill Covers, Solid Waste Research Program, State of Wisconsin.

Shear Strength of Municipal Solid Waste, WMX Technologies, Inc., with T. Edil.

Evaluating the Effectiveness of Landfill Liners, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

Laboratory and Field Evaluation of the Effects of Freeze-Thaw on Barrier Materials, United States Environmental Protection Agency.

Field-Evaluation of Geoinsulation-A Geosynthetic Insulation Material, Envotech Limited Partnership, with P. Bosscher

Hydraulic Conductivity Assessment of Compacted Soil Liners, Waste Management of North America, Inc.

Rational Construction Quality Control Criteria for Compacted Soil Liners, University of Wisconsin Graduate School.

Final Cover Hydrologic Evaluation, Waste Management of North America, Inc.

Evaluation of Freezing and Thawing on the Hydraulic Conductivity of a Test Pad, Waste Management of Wisconsin, Inc.

Improved Design Methods for Landfill Final Covers, National Science Foundation.

Quality Assurance and Hydraulic Conductivity Assessment of Compacted Soil Liners, Waste Management of North America and Chemical Waste Management, Inc.

Hydrologic Analysis of a Co-Composting Landfill, Solid Waste Research Council, State of Wisconsin.

Sustainability and Sustainable Infrastructure

Center for Mineral and Metal Oxide Removal from Biomass (CMORE), Schmidt Sciences and the Foundation for Food & Agriculture Research, with Idaho National Laboratory, Iowa State University, University of Kansas, and Idaho State University.

Using Harvested Ash in Concrete and Cement Production, Electric Power Research Institute, Palo Alto, California.

Multi-University Center on Chemical Upcycling of Waste Plastics (CUWP), Office of Energy Efficiency and Renewable Energy US Department of Energy, with U. Wisconsin-Madison, U. Massachusetts, and Iowa State U.

Greenhouse Gas Emissions, Climate Change, and the Impacts of Climate Policy on the Global Coal Industry, Vigoris Coal Coalition LLP, Vancouver, BC.

Sustainability Assessment and Greenhouse Gas Implications of Envirocoal, Adaro Energy PT, Jakarta Indonesia.

Exchange Network for Expanded Polystyrene Bio-Shipping Containers, People, Prosperity, & Planet (P3) Program-Phase II, US Environmental Protection Agency

Exchange Network for Expanded Polystyrene Bio-Shipping Containers, People, Prosperity, & Planet (P3) Program-Phase I, US Environmental Protection Agency

Leaching from Roadways Constructed with Unencapsulated CCPs: Data Assessment & Synthesis, Electric Power Research Institute, with T. Edil.

Climate Change Mitigation and Adaptation in Dairy Production Systems of the Great Lakes Region, United States Department of Agriculture, National Institute of Food and Agriculture, with Matthew Ruark (PI) and others.

Recycled Materials Resource Center – Third Generation, Federal Highway Administration Pooled Fund, with T. Edil.

Recycled Materials Resource Center, Federal Highway Administration and United States Environmental Protection Agency, with K. Gardner

Environmental Benefits of Using Coal Combustion Products in Construction, Electric Power Research Institute, with T. Edil

Engineering Behavior of Recycled Unbound Materials, US Dept. of Transportation Pooled Fund, with T. Edil.

Assessing Environmental Impacts Associated with Bases and Subgrades Stabilized with Coal Combustion Products, Center for Freight and Infrastructure Research and Education, US Department of Transportation, with T. Edil.

User Guidelines for Waste and By-Product Materials in Highway Pavements, US Environmental Protection Agency, with A. Graettinger and J. Jambeck

Gravel Equivalency of Fly Ash Stabilized Reclaimed Roads, Minnesota Local Roads Research Board, with T. Edil

In Situ Stabilization of Gravel Roads with CCPs, Combustion Byproducts Recycling Consortium, US Dept. of Energy, with T. Edil

Leaching of Heavy Metals from Gray-Iron Foundry Slags Used in Geo Engineering Applications, Solid Waste Research Council, State of Wisconsin, with T. Edil.

Monitoring and Analysis of Leaching from Subbases Constructed with Industrial Byproducts, FHWA Recycled Materials Research Center, with T. Edil.

Ash Utilization in Low Volume Roads, Minnesota Department of Transportation, with T. Edil

Integrated Approach for Assessing Groundwater Impacts from Fly Ash Stabilized Soils, Alliant Energy, with T. Edil.

Geoenvironmental Assessment of Soft Soils Stabilized with High Carbon Fly Ashes, Solid Waste Research Program, State of Wisconsin, with T. Edil.

Are High Carbon Fly Ashes Effective Stabilizers for Soft Organic Soils?, National Science Foundation, with T. Edil.

Consortium for Beneficial Reuse of Fly Ashes, Alliant Energy, Northern States Power, and Mineral Solutions, Inc., with T. Edil.

Reuse of Fly Ash for Soil Stabilization, US Dept. of Energy, with T. Edil.

Field Demonstration of Earth Structures Constructed with Soil-Tire Chip Mixtures, Solid Waste Research Council, State of Wisconsin, with T. Edil.

Use of Foundry Sands in Hot Mix Asphalt, University Industrial Relations, with H. Bahia

Fly Ash Stabilization of Soft Subgrades, US Dept. of Energy, Mineral Solutions, Inc., and Alliant Power, with T. Edil.

Field Demonstration of Beneficial Reuse of Foundry Byproducts in Highway Subgrade, Wisconsin Department of Transportation, with T. Edil.

Properties of Foundry Sand Relevant to Design of Embankments and Retaining Wall Backfill, State of Wisconsin, Recycling Market Development Board, with T. Edil.

National Practice Survey: Beneficial Re-use of Waste Foundry Sands, State of Wisconsin Recycling Market Development Board, with T. Edil.

Using Waste Foundry Sands as Hydraulic Barriers, Solid Waste Research Council, State of Wisconsin, with T. Edil.

Field Assessment of Barrier Layers Constructed with Foundry Sands, Solid Waste Research Council, State of Wisconsin, with T. Edil.

Use of Shredded Waste Tires in Highway Construction, United States Environmental Protection Agency, with T. Edil.

Sub-base Replacement with Waste Foundry Sands, State of Wisconsin, Recycling Market Development Board, with T. Edil.

Using High Carbon Class F Fly Ash as a Lining Material: I-Laboratory Study, Solid Waste Research Council, State of Wisconsin, with T. Edil.

Using High Carbon Class F Fly Ash as a Lining Material: II-Field Verification, Solid Waste Research Council, State of Wisconsin, with T. Edil.

Reinforcement of Soils with Shredded Waste Tires, Solid Waste Research Council, State of Wisconsin, with P. Bosscher.

Use of Reclaimed Waste HDPE as Soil Reinforcement, Solid Waste Research Council, State of Wisconsin.

Groundwater

Leaching and Mobility of Per and Polyfluoroalkyl Substances (PFAS) from Concrete and Asphalt, Strategic Environmental Research and Development Program, US Dept. of Defense, with J. Guelfo and D. Kosson.

Sorption and Transport of Polycyclic Aromatic Hydrocarbons in Organoclays used for Permeable Adsorptive Barriers, CH2M Hill Inc. and Union Pacific Inc.

Environmental Impacts of Engineered Nanomaterials, Nanoscale Science and Engineering Center, National Science Foundation, with J. Pedersen and R. Hammers

Gray-Iron Foundry Slags as a Reactive Medium for Removing Arsenic from Ground Water and Drinking Water, Groundwater Research Advisory Council, State of Wisconsin, with D. Blowes.

Innovative Treatment of COPR Wastes in Coastal Areas, US Dept. of Transportation, with T. Edil.

Development of Large-Scale Application for Remediation of Chromium Ore Processing Residue, University Industrial Relations, University of Wisconsin, with T. Edil.

An Integrated Approach to Evaluating Environmental Impacts from Soils Stabilized with Fly Ashes, State of Wisconsin Recycling Program and Alliant Energy, Inc.

Uncertainty Based Design of Permeable Reactive Barriers, Wisconsin Ground Water Research Advisory Council, with G. Eykholt

Innovative Groundwater Treatment: Reactive Walls Constructed with Excess Foundry Sand, Wisconsin Groundwater Research Advisory Council, with G. Eykholt.

Development of Integrated Decision Support System for Wellhead Protection, Wisconsin Water Resources Council, State of Wisconsin.

Reducing Uncertainty in Subsurface Characterization, U.S. Department of Energy.

Ultrasonic Probe to Evaluate the Integrity of Borehole Seals, Federal Highway Administration, with T. Edil.

Field Assessment of Monitoring Well Seal Integrity, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

A Tool for Evaluating the Integrity of Monitoring Well Seals, Groundwater Research Advisory Council, State of Wisconsin, with T. Edil.

Characterization of Air Plumes and Modeling Mass Removal During In Situ Air Sparging, Groundwater Research Advisory Council, State of Wisconsin, with G. Eykholt.

Education

Wisconsin-Puerto Rico Partnership for Research and Education in Materials [Wi(PR)EM], US National Science Foundation, with J. de Pablo, J. Pedersen, et al.

A Modular Geoenvironmental Curriculum, National Science Foundation, with other faculty from Wisconsin, Northwestern, Michigan, and Argonne National Laboratory.

Research Experience for Undergraduates Site, Geothermal and Energy Geotechnics, National Science Foundation, with J. Tinjum (PI), D. Fratta (co-PI), and S. Bradshaw.

Transforming CEE/GLE 330, Soil Mechanics, to Blended Learning, Division of Continuing Studies, University of Wisconsin-Madison.

Other Topics

Wisconsin Highway Research Program, Wisconsin Department of Transportation, with T. Edil.

Fate and Transport of Chronic Waste Disease Prions in Waste Water Treatment Plants, US Environmental Protection Agency

Stiffness and Stress State in Unsaturated Soils, Minnesota Department of Transportation, with T. Edil.

Thermal Conditions Below Highway Pavements During Winter, Wisconsin Department of Transportation, with P. Bosscher.

Design Protocols for Cellular Confinement with Geoweb, University Industrial Relations and Presto Products, Appleton, WI, with T. Edil.

Equivalency of Subgrade Improvement Methods, Wisconsin Department of Transportation, with T. Edil.

Reinforcement of Soft Subgrades with Geosynthetics, Wisconsin Department of Transportation, with T. Edil.

Evaluation of the DCP and SSG for Subgrade Evaluation, Wisconsin Department of Transportation, with T. Edil.

Shear Strength of Granular Backfill Materials, Wisconsin Department of Transportation, with T. Edil.

Correlating Index Properties and Engineering Behavior of Wisconsin Soils, Wisconsin Department of Transportation, with T. Edil.

Incorporating Alternative Subgrade Improvement Methods in Pavement Design, Wisconsin Department of Transportation, with T. Edil.

STEM TEACHER ENGAGEMENT

The following STEM teachers have been engaged in our research and educational programs through NSF's *Research Experience for Teachers* (RET) program:

Hayden, Matthew, Earth Science Teacher, Glacier Creek Middle School, Middleton-Cross Plains School District, Middleton, Wisconsin.

Kisting, Richard, Science Teacher, Badger Ridge Middle School, Verona Area School District, Verona, Wisconsin.

GRADUATE STUDENTS SUPERVISED

PhD Students

- Abichou, T., Hydraulic Properties of Foundry Sands, co-advised with T. Edil, 1999.
- Albrecht, B., Passive Dry Barriers: Air Circulation and Mass Transfer, 2001.
- Albright, W., Field Performance of Landfill Covers, 2005.
- Apiwantragoon, P., Alternative Covers: Field Performance and Modeling Methods, 2007.
- Bareither, C., Settlement of Bioreactor Landfills: Compression Mechanisms, co-advised with T. Edil, 2010.
- Breitmeyer, R., Unsaturated Hydraulic Properties of Solid Waste and Hydrology of Bioreactor Landfills, co-advised with T. Edil, 2010.
- Bin-Shafique, S., Leaching of Heavy Metals from Fly Ash Stabilized Soils, co-advised with T. Edil, 2002.
- Chalermyanont, T., Reliability Analysis of Mechanically Stabilized Earth (MSE) Walls, 2002.
- Chang, P., Geophysical Characterization of Water and Solute Movement in an Arid Climate, 2003, co-advised with D. Alumbaugh.
- Chen, J., Chemical Interactions between Coal Combustion Products and Geosynthetic Clay Liners, 2015.
- Elder, C., Effect of Heterogeneity on Performance of Permeable Reactive Barriers, 2000.
- Eun, J., Diffusive Transport of Organic Compounds in Liquid and Gas Phases through Co-Extruded EVOH Geomembranes, with J. Tinjum, 2014.
- Foose, G., Leakage Rates and Chemical Transport Through Composite Landfill Liners, co-advised with T. Edil, 1997.
- Gulec, S., Compatibility of Geosynthetics and Mine Waste Liquids, co-advised with T. Edil, 2003.
- Gustitus, S. Accelerated Degradation and Service Life Prediction of Bentonite-Polymer Composite GCLs, 2021.
- Hunter, E., Sorption of Radionuclides in Engineered Barrier Materials, with J. Tinjum, 2014.
- Jo, H., Fundamental Factors Affecting Interactions Between Bentonite and Inorganic Liquids, 2003.
- Khire, M., Field Hydrology and Water Balance Modeling of Earthen Final Covers for Waste Containment, 1995.
- Kim, H., Oxygen Transport Through Multi-Layer Caps Over Mine Waste, 2000.
- Kim, W., Alternative Subgrades Stabilization with Geosynthetics, co-advised with T. Edil, 2003.
- Komonweeraket, K., Mechanisms Controlling Release of Trace Elements from Soils Stabilized with Fly Ash, co-advised with T. Edil, 2010.
- Lee, T., Using Waste Foundry Sands as Reactive Media in Permeable Reactive Barriers, 2002.
- Li, L., Impacts of Mineralogical Fouling of Permeable Reactive Barriers in Heterogeneous Environments, 2004.
- Nokkaew, K., Unsaturated Hydraulic Behavior of Recycled Base Course Materials, co-advised with J. Tinjum, 2014.
- Othman, M., Effect of Freeze/Thaw on the Structure and Hydraulic Conductivity of Compacted Clays, 1992.
- Park, M., Transport of VOCs in Composite Landfill Liners, co-advised with T. Edil, 2011.
- Scalia, J., Bentonite-Polymer Nanocomposites for Environmental Containment, 2012.
- Tachavises, C., Flow Rates Past Vertical Groundwater Cut-Off Walls: Influential Factors and Their Impact on Wall Selection, 1998.

Tanyu, B., Equivalency of Alternative Subgrade Stabilization Methods, co-advised with T. Edil, 2003.
Tian, K., Life Expectancy of Geomembranes Used in Low-Level Radioactive Waste Containment, 2015.
Tinjum, J., Innovative Remedial Treatment of Chromium Ore Processing Residues, co-advised with T. Edil, 2006.
Yesiller, N., Ultrasonic Evaluation of Cased Borehole Seals, 1994, co-advised with T. Edil.
Yu, T., Effect of PFAS on Effectiveness of Landfill Liner Systems, 2023, in progress.

MS Students

Abichou, T., Field Evaluation of Geosynthetic Insulation for Protection of Clay Liners, 1993.
Abu Hassanein, Z., Using Electrical Resistivity Measurement as a Quality Control Tool for Compacted Clay Liners, 1994.
Acosta, H., Stabilization of Soft Subgrade Soils Using Fly Ash, with T. Edil, 2002.
Albrecht, B., Effect of Desiccation on Hydraulic Conductivity of Compacted Clays, 1995.
Akpinar, M., Interface Shear Strength of Geomembranes and Geotextiles at Different Temperatures, 1997.
Bahner, E., Soil Nailing Case Histories in Wisconsin, 1993.
Baker, D., Physical Modeling of In Situ Air Sparging, 1996.
Bareither, C., Geological Controls on the Shear Strength of Wisconsin Sands, with T. Edil, 2006.
Basantis, A., Hydraulic Properties of Sluiced Coal Ashes, 2021.
Bashel, M., Flow Rates in Composite Landfill Liners, 1993.
Baugh, J., Fly Ash Stabilization of Gravelly Soils, with T. Edil, 2008.
Benavides, J. Marie, Hydrologic Predictions for Coal Combustion Products Disposal Facilities, did not finish thesis.
Beuermann, S., Dielectric Sensor for Measuring Suction in Dry Soils, 1999.
Bohnhoff, G., Predicting the Water Balance of Alternative Covers Using UNSAT-H, 2005.
Bozyurt, O., Effect of Deleterious Materials on the Mechanical Properties of RAP and RCA, with T. Edil, 2011.
Bradshaw, S., Effects of Stress, Hydration, and Ion Exchange on Geosynthetic Clay Liners, 2008.
Bridstrup, J., Transport of Polyfluorinated Compounds Through Engineered Barrier Materials, 2020.
Brown, B., Leaching of Trace Elements from Roadways Constructed with CCPs, 2015.
Camacho, L., Analysis of Landfill Failure Using Three-Dimensional Limit Equilibrium Methods, with T. Edil, 2002.
Camargo, F., Equivalency of Fly-Ash Stabilized RPM and Gravel Base Course, with T. Edil, 2008.
Chen, C., Meteorological Conditions for Design of Monolithic Alternative Earthen Final Covers (AEFCs), 1999.
Chiang, I., Effect of Fines and Gradation on Soil Water Characteristic Curves of Sands, 1998.
Christman, M., Annular Well Seals: A Geophysical Study of Influential Factors and Seal Quality, with T. Edil, 1999.
Cope, D., Treating TCE-Contaminated Groundwater with Gray-Iron Slag, 2007.
Cooper, S., An Evaluation of How Subsurface Characterization Using Soil Classifications Affects Predictions of Containment Transport, 1993.
Dingrando, J., Beneficial Reuse of Foundry Sands in Controlled Low Strength Material, with T. Edil, 1999.
Eberhardt, M., Leaching of Heavy Metals from Gray-Iron Slags with and without Carbonation, 2008.

- Elder, C., Modeling Mass Transfer During In Situ Air Sparging, 1996.
- Foose, G., Shear Strength of Sand Reinforced with Shredded Waste Tires, 1993.
- Gavin, M., Physical and Chemical Effects of Electroosmosis on Kaolinite, with T. Edil, 1997.
- Genthe, D., Shear Strength of Two Pulp and Paper Mill Sludges with Low Solids Content, 1993.
- Gibson, S., Geoelectric Methods to Evaluate Borehole Seals, with T. Edil, 1999.
- Goodhue, M., Reuse of Foundry Sands in Reinforced Earthen Structures, with T. Edil, 1998.
- Gurdal, T., Unsaturated Hydraulic Properties of Alternative Cover Soils, 2003.
- Hardianto, F., Representative Sample Size for Hydraulic Conductivity of Compacted Clay, 1993.
- Harrick, M., Permeable Reactive Walls in Wisconsin, 1994.
- Hill, T., Field and Laboratory Hydraulic Conductivity of Compacted Mine Waste Rock, 1997.
- Jo, H., Chemical Compatibility of Non-Prehydrated GCLs and Inorganic Liquids, 1999.
- Jong, D., Load Limit Timings for Roadways Exposed to Frost, 1997.
- Kim, K., Water Content Reflectometer Calibrations for Final Cover Soils, 2002.
- Kircher, J., Modeling Chemical and Physical Effects of Electro-osmosis on Kaolinite, with T. Edil, 1997.
- Klett, N., Evaluation of VOC Discharges to Groundwater from Engineered Landfills in Wisconsin, with T. Edil, 2005.
- Kolstad, D., Hydraulic Conductivity and Ion Exchange in GCLs Permeated with Multispecies Inorganic Solution, 2000.
- Kleven, J., Mechanical Properties of Excess Foundry System Sand and an Evaluation of its use in Roadway Structural Fill, with T. Edil, 1997.
- Klima, J., Field Assessment of Monitoring and Water Supply Well Seals, with T. Edil, 1996.
- Kraus, J., Hydraulic Conductivity of Papermill Sludges, 1994.
- Kucukkirca, I., In-Service Properties of Geosynthetic Materials Exhumed from Landfill Final Covers, with J. Tinjum, 2009.
- Lanier, A., VOC Transport in Geosynthetic Clay Liners, 2002.
- Lane, D., Hydrologic Observations and Modeling Assessments of Landfill Covers, 1992.
- Lau, W., Use of Geocells in Flexible Pavements Over Poor Subgrades, with T. Edil, 2001.
- Lee, T., Physical Modeling of Vertical Groundwater Cut-Off Walls, 1999.
- Lin, L.C., Effect of Wet-Dry Cycling on Swelling and Hydraulic Conductivity of Geosynthetic Clay Liners, 1998.
- Marchesi, I., Simulating the Hydrology of Alternative Covers with *SoilCover*, 2002.
- Maxwell, S., Geosynthetic Reinforcement of Soft Subgrades, with T. Edil, 1999.
- Meer, S., Effects of Ion Exchange and Desiccation on GCLs used in Final Covers, 2003.
- Meerdink, J., Unsaturated Hydraulic Conductivity of Barrier Soils Used for Final Covers, 1994.
- Mengelt, M., Effect of Cellular Confinement on Soil Stiffness Under Dynamic Loads, with T. Edil, 2000.
- Mergener, E., Assessing Clogging of Permeable Reactive Barriers in Heterogeneous Aquifers Using a Geochemical Model, 2002.
- Metz, S., Gray-Iron Slags as a Reactive Medium for Arsenic Treatment, 2007.
- Nelson, M., Laboratory Hydraulic Conductivity Testing Protocols for Paper Sludges in Barrier Layers, 2001.
- Olson, R., Source and Prevention Strategies for Black Goo in Landfills, Summer 2023.
- Palmer, B., High Carbon Class F Fly Ash for Reactive Barrier Landfill Liners, with T. Edil, 1995.
- Payne, L., Use of Pulsating Electro-Osmosis in Barrier Applications, with T. Edil, 1995.
- Rauen, T., Effect of Bioreactor Leachate on Geosynthetic Clay Liners, 2007.
- Pekarun, O., Evaluation of Hydraulic Significance of Defects in Annular Well Seals, with T. Edil, 1994.

- Rochford, W., Effectiveness of Geomembrane and Soil-Bentonite Cut-Off Walls, 2002.
- Roesler, A., Field Hydrology and Model Predictions for Final Covers in the Alternative Assessment Program, 2002.
- Rosa, M., Effect of Freeze-Thaw Cycling on Resilient Modulus of Fly-Ash Stabilized Subgrade Soils, with T. Edil, 2006.
- Sauer, J., Leaching of Heavy Metals from Organic Soils Stabilized with High Carbon Fly Ashes, with T. Edil, 2005.
- Sajjad, M., Effect of Electro-Osmosis on Hydraulic Conductivity of Compacted Clay, 1993.
- Scalia, J., Hydraulic Conductivity of Geosynthetic Clay Liners Used in Composite Final Covers, 2009.
- Schlicht, P., Weathering-Induced Alterations in the Hydraulic Properties of Final Covers for Waste Containment, with J. Tinjum, 2009.
- Setz, M., Ammonia exchange in Na-Bentonites Used for Waste Containment, 2013.
- Simon, D., Comparison of Three Geophysical Imaging Techniques for Characterization of an IAS Plume, with D. Alumbaugh, 2001.
- Smith, C., Coupling Hydrology and Erosion Control Design for Final Covers for Low-Level Radioactive Waste Containment, 2011.
- Stefani, Nicholas, Field Evaluation of Radon Flux from Historic Uranium Mill Tailings Disposal Facilities, 2016.
- Suwansawat, V., Using TDR for Moisture Movement in Clays, 1997.
- Tan, Y., PFAS Transport through Engineered Barriers for Waste Containment, Webinr2024.
- Tastan, O., Stabilizing Organic Soils with High Carbon Fly Ashes, with T. Edil, 2005.
- Tatliso, N., Using Tire Chips in Earthen Structures, with T. Edil, 1995.
- Thorstad, P., Field Performance of a Geosynthetic Clay Liner (GCL) Used as the Hydraulic Barrier Layer in a Landfill Cover in Southwestern Wisconsin, 2002.
- Tian, K., Leachate Chemistry and Geomembrane Durability in Low-Level Radioactive Waste Containment, 2012.
- Trast, J., Field Hydraulic Conductivity of Thirteen Compacted Clay Liners, 1993.
- Tinjum, J., Soil Water Characteristic Curves for Compacted Fine Grained Soils, 1995.
- Trzebiatowski, B., Effect of Pedogenesis on Soil Water Characteristic Curves of Cover Soils, 2004.
- Vasko, S., Hydraulic Conductivity of Prehydrated Geosynthetic Clay Liners Permeated with Calcium Chloride Solutions, 1999.
- Wang, X., Evaluating Suction Head at the Wetting Front During Infiltration in Compacted Clays, 1993.
- Williams, Thomas, Engineering Properties of a Composite Barrier System Exposed for a Decade, 2018.
- Winkler, W., Thickness of Monolithic Covers in Arid and Semi-Arid Climates, 1999.
- Woodward, N., Life Expectancy of Geosynthetic Materials Used in Low-Level Radioactive Waste Containment, with J. Tinjum, 2011.
- Zangl, F., Impact of Cyclic Dehydration on Bentonite-Polymer Nanocomposites Used for Waste Containment, with W. Likos, 2014.

EDITORSHIPS

Editor-in-Chief, ASCE *Journal of Geotechnical and Geoenvironmental Engineering*, 2004-2006

Editor, ASCE *Journal of Geotechnical and Geoenvironmental Engineering*, 1996-99

Editorial Board, *Journal of Geotextiles and Geomembranes*, 2009-2021.

Editorial Board, *Environmental Geotechnics J.*, 2014-2021.

Editorial Board, *Coal Combustion and Gasification Products J.*, Asst. Editor, 2017-present.

Co-Editor, *Waste Containment and Remediation*, GSP No. 142, ASCE, A. Alshawabkeh et al., co-editors, 2005.

Editor, *Risk-Based Corrective Action and Brownfields Restorations*, GSP No. 82, ASCE, J. Meegoda, R. Gilbert, and S. Clemence, co-editors, 1998

Co-Editor, Environmental Geotechnics Section, *Geotechnical News*, 1994-1996

Co-Editor, Special Issue on Innovations in Solid Waste Engineering and Management: The 2008 Global Waste Management Symposium, *J. of Environmental Engineering*, M. Barlaz, co-editor, 136(8), 2010.

ATTACHMENT G



BARBARA FERRER, Ph.D., M.P.H., M.Ed.
Director

MUNTU DAVIS, M.D., M.P.H.
County Health Officer

ANISH P. MAHAJAN, M.D., M.S., M.P.H.
Chief Deputy Director

AZAR KATTAN, J.D., M.P.H.
Deputy Director for Health Protection

LIZA FRIAS, REHS
Director of Environmental Health

SCOTT ABBOTT, REHS, M.P.A.
Assistant Director of Environmental Health

5050 Commerce Drive
Baldwin Park, California 91706
TEL (626) 430-5374 • FAX (626) 813-3000

www.publichealth.lacounty.gov/eh/



BOARD OF SUPERVISORS

Hilda L. Solis
First District

Holly J. Mitchell
Second District

Lindsey P. Horvath
Third District

Janice Hahn
Fourth District

Kathryn Barger
Fifth District

November 20, 2025

Via Electronic Correspondence

Mr. Steve Cassulo, District Manager
Steven.cassulo@wasteconnections.com
Chiquita Canyon Landfill
29201 Henry Mayo Drive
Castaic, CA 91384

**SUBJECT: LEA COMMENTS ON THE DRAFT REMOVAL ACTION WORKPLAN (RAW)
CHIQUITA CANYON LANDFILL (CCL), SWIS NO. 19-AA-0052**

Dear Mr. Cassulo,

On June 2, 2025, the Los Angeles County Department of Public Health, Solid Waste Management Program, acting as the Local Enforcement Agency (LEA), received Chiquita Canyon Landfill's (CCL) *Draft Removal Action Workplan: Interim Relocation and Stabilization of Containerized Waste, Chiquita Canyon Landfill* (Workplan) dated May 9, 2025, and prepared by Civil and Environmental Consultants, Inc. The Workplan was prepared in response to the Imminent and Substantial Endangerment Determination and Order (ISE Order) issued by the California Department of Toxic Substances Control (DTSC) on April 2, 2025, regarding the Subsurface Elevated Temperature (SET) Event occurring at the CCL. CCL has submitted the Workplan to the LEA to address Section 4.3 of the LEA's May 1, 2025 Compliance Order (LEA Order).

CCL's Workplan again does not propose construction of a vertical soil barrier and instead provides justification for not installing one. Further, CCL has informed the U.S. EPA, DTSC, CalRecycle and the LEA that it does not intend to construct the required barrier. Rather, CCL asserts that continued gas and leachate removal will contain the Subsurface Elevated

Temperature (SET) event. However, available data indicate that the SET event continues to expand, and the current gas and leachate extraction approach has not proven effective in containing or stopping the growth of the reaction. The LEA has significant concerns with both the current and future conditions at the landfill.

CCL has failed to install a vertical soil barrier pursuant to the LEA's May 1, 2025 Compliance Order, which was required to protect Cell 8A from the intrusion of the SET event. Section 4.3 of the LEA Order directed CCL to verify or extend the "previously constructed soil barrier" that CCL represented was present, to connect the western and eastern edges of Cell 8A. Based upon current available data, there is no "previously constructed soil barrier" that would have been capable of extension to connect the western and eastern edges of Cell 8A. Since CCL has elected not to install any vertical barrier to protect Cell 8A from the expanding SET event, CCL is directed to propose alternatives, identical to the proposed alternative requirements provided on pages 5-6 of DTSC's October 15, 2025 letter to CCL and in compliance with DTSC's conditions, to protect Cell 8A. Please confirm to the LEA by November 26, 2025, CCL's agreement to provide a Cell 8A Protection Alternative Workplan to the LEA.

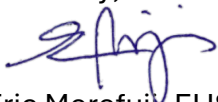
Based on deteriorating site conditions and available data, CalRecycle and the DTSC have expressed serious concerns regarding global slope stability impacts and potential need for alternative mitigation measures as the SET event continues to expand. After technical consultation with CalRecycle, the LEA now requires CCL to conduct a global slope stability study for areas where critical infrastructure is located (e.g., Temporary Tank Farm 13, located in Cell 8B). The LEA understands that CCL is currently preparing a Slope Stability Workplan, as required in DTSC's October 15, 2025 letter to CCL, which is due to be submitted to DTSC by November 21, 2025. Provide a copy of the Slope Stability Workplan to the LEA at the time it is submitted to DTSC to satisfy this requirement. This will allow the LEA to participate in the technical review of CCL's new Plan and provide comments.

The LEA reserves the right to issue a new directive or order if site conditions or available data indicate that additional corrective actions are necessary to protect public health and the environment.

Ensure to obtain all permits and approvals from Federal, State and Local agencies as required by the law and regulations.

If you have any questions, please email me at emorofuji@ph.lacounty.gov or call me at (213) 668-2206.

Sincerely,

A handwritten signature in blue ink, appearing to read "Emorofuji", is written over a horizontal line.

Eric Morofuji, EHS III
Solid Waste Management Program
Local Enforcement Agency (LEA)

Cc: (Via Electronic Correspondence Only)

- Robert Ragland, Los Angeles County Department of Public Health
- Liza Frias, Los Angeles County Department of Public Health
- Azar Kattan, J.D., M.P.H, Los Angeles County Department of Public Health
- Ken Habaradas, Los Angeles County LEA
- Karen Gork, Los Angeles County LEA
- Renee Jensen, LEA Counsel (rjensen@bgsplaw.com)
- Blaine McPhillips, Senior Deputy County Counsel
- Emiko Thompson, Los Angeles County Department of Public Works
- Alex Garcia, Los Angeles County Department of Regional Planning
- Ai-Viet Huynh, Los Angeles County Department of Regional Planning
- Wes Mindermann, CalRecycle (wes.mindermann@calrecycle.ca.gov)
- Todd Thalhamer, CalRecycle (todd.thalhamer@calrecycle.ca.gov)
- Rachel Beck, CalRecycle (rachel.beck@calrecycle.ca.gov)
- Janelle Heinzler, CalRecycle (janelle.heinzler@calrecycle.ca.gov)
- Jeff Lindberg California Air Recourses Board (jeff.lindberg@arb.ca.gov)
- Jack Cheng, South Coast Air Quality Management Board (icheng@aqmd.gov)
- Larry Israel, South Coast Air Quality Management Board (lisrael@aqmd.gov)
- Enrique Casas, Los Angeles Regional Water Quality Control Board (enrique.casas@waterbaords.ca.gov)
- Amy Miller, United States Environmental Protection Agency (Miller.Amy@epa.gov)
- Joel Jones, United States Environmental Protection Agency (Jones.Joel@epa.gov)
- Peter Ruttan, Department of Toxic Substances Control (Peter.Ruttan@dtsc.ca.gov)