KLEINFELDER
Bright People. Right Solutions.

January 12, 2017
Kleinfelder Project No.: 20170041.001A

Mr. John Ioannou
Mr. Thomas M. Burrup
Environmental Manager
Salt Lake Valley Solid Waste Management
6030 West California Avenue
Salt Lake City, UT 84104

SUBJECT: Analysis of Pipe Crushing Capacity
Landfill Height Change Feasibility Study
Salt Lake County Landfill
Salt Lake County, UT

Dear Messrs. Ioannou & Burrup:

We understand that in planning for the future operations and eventual closure of the landfill site, the Utah Division of Waste Management and Radiation Control has requested that Salt Lake Valley Solid Waste Management Facility (SLVSWMF) study the geotechnical feasibility of the current plan to raise the height of the existing landfill cells above the elevation currently specified and approved in the existing solid waste permit. The proposed change increases the maximum landfill height to 205 ft. Our settlement and stability analyses discussed in the feasibility study dated August 9, 2016 (Kleinfelder Project No: 20170041.001A) indicate that the landfill can be raised without failure of the liner and without stability problems. This letter discusses the effects of the increased landfill height (and resulting stresses) on the leachate collection pipes.

Based on measurements of the existing HDPE leachate collection pipes, proposed increase in landfill height, and typical soil properties of landfill material, the pipe sections near the bottom of the landfill may experience compressive stresses ranging from approximately 220 psi to 430 psi. Typical compressive strength of HDPE material ranges from 1600 psi to 4500 psi. Specific stresses and safety factors are:

Pipe ID	Inside Diameter (in)	Outside Diameter (in)	Compressive Stress (psi)	HDPE Compressive Strength (psi)	Factor of Safety
S1	40.13	46.13	224.0	1600 - 4600	7.1 - 20.5
S2	43.50	46.50	422.5	1600 - 4600	3.8 - 10.9
S3	44.38	47.38	429.9	1600 - 4600	3.7 - 10.7
S4	29.75	34.25	222.1	1600 - 4600	7.2 - 20.7
S5	45.25	52.25	218.4	1600 - 4600	7.3 - 21.1
S6	42.38	46.63	307.3	1600 - 4600	5.2 - 15.0
S7	43.00	46.00	418.2	1600 - 4600	3.8 - 11.0
Horizontal	14.13	18.13	374.9	1600 - 4600	4.3 - 12.3

849 West Levoy Drive, Suite 200 Salt Lake City, UT 84123 **p** | 801.261.3336 **f** | 801.261.3306

The compressive stresses calculated are based on the assumption that the pipe has remained circular in shape. If the pipe has deformed, the applied stresses would likely be greater than the estimates shown above. Estimating the applied stresses for non-circular pipe sections would require a more rigorous analysis. If desired, Kleinfelder could be perform a more complex analysis to estimate the applied stresses in deformed shapes.

CLOSURE

Our work was performed in a manner consistent with that level of care and skill ordinarily exercised by professionals practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions and recommendations were based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no guarantee or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

We appreciate the opportunity to complete this study. If you have any questions or need additional information, please contact Trent Parkhill at 801.261.3336.

Sincerely,

KLEINFELDER

Trent Parkhill, PE
Senior Principal Geotechnical Engineer

Matthew Moriarty, EIT
Staff Geotechnical Engineer

KLEINFELDER 849 West Levoy Drive, Suite 200 Salt Lake City, UT 84123 **p** | 801.261.3336 **f** | 801.261.3306