# Old Hawthorne Landfill Cleanup:
# Technical Justifications

Prepared by: Nevada Division of Environmental Protection, Brownfields Program
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## I. Purpose of Memorandum

The purpose of this technical memorandum is to document that sufficient characterization of the old Hawthorne landfill has been undertaken to

a) demonstrate that the site poses a threat to human health through the presence of hazardous substances, and

b) develop a cleanup plan which will mitigate the environmental concerns at the site and allow for surrounding development.

Since the above goals have been met with existing characterization efforts, further environmental assessment will not be necessary to allow Hawthorne access to funding from the State of Nevada's Brownfields Program.

## II. Executive Summary

## III. Technical Discussion

### A. Introduction

The Old Hawthorne Landfill has been designated a high-priority Brownfields site by the State of Nevada and US EPA Region IX. Both agencies have been involved in providing environmental assessment services to the Town of Hawthorne/Mineral County through their Brownfields Programs. The Town of Hawthorne is looking to develop the surrounding area, the only land to which they have access, as a residential neighborhood with recreational opportunities. This development is hindered by the presence of the old solid waste municipal landfill which ceased operation in 1972 and was never closed consistent with State environmental regulations.

The State of Nevada feels that sufficient characterization of the landfill has been performed to determine that the site poses an environmental risk due to the likely presence of hazardous substances and to evaluate a proper remedy which would eliminate threats to surrounding residences. Characterization efforts undertaken to date include the collection of historic information and documentation in a Phase I report; the identification through aerial photos and site visits of all cells operated for the collection of wastes; exploratory trenching to determine the contents, depth, and depth of cover of all cells; and a geophysical survey to confirm the subsurface location and extent of landfill cells.

While no chemical samples have been taken of the soils around the landfill to demonstrate the presence and migration of hazardous substances, the State feels that the site warrants the utilization of Brownfields cleanup funds to be protective of human health. This conclusion has been based on the types of wastes deposited at the site, the operational history, and the similarity to other landfills in the area for which the presence of hazardous substances has been detected.

**B. Source Characterization**

The Old Hawthorne Landfill which is located approximately one quarter mile west of the Town of Hawthorne was operated as a municipal solid waste landfill until 1972. Reports indicate that the landfill may have been accepting waste as early as the 1920s, but characterization efforts indicate that much of the waste was from the 50s and 60s. There is no indication that waste was placed in landfill trenches later than 1974, though illegal surface dumping of material has continued to be a source of waste collected at the site.

Little or no operational records were kept for the landfill, but all available historic evidence and current characterization efforts undertaken indicate that the landfill contains household or municipal wastes which were placed into a series of trenches and burned prior to burial. There is no indication either from historic sources or exploratory trenches of bulk disposal of Hazardous, Toxic, or Radioactive Waste nor were there any discovered ordinance or explosives.

During potholing activities conducted at the site through a Targeted Brownfields Assessment, waste in the trenches was characterized as containing primarily glass, metal, and some wood and paper mixed with ash. There were four areas of the site which contained materials other than municipal waste. These cells contained predominantly large metal debris (most of which could be dated past 1972).

The areas where environmental concerns most likely exist are the cells with burned municipal wastes. Due to the large size of the landfill and the long operational history, it would be impossible to fully characterize the wastes which were disposed of at the landfill. There is however a high likelihood that significant amounts of household hazardous wastes were disposed of in the landfill including pesticides, solvents, batteries, paints, and thinners. Beyond the household hazardous waste which may have been deposited at the landfill, the ash resulting from the incomplete combustion of a variety of wastes also poses an environmental threat, as combustion is known to result in the production of a variety of polynuclear aromatic hydrocarbons, a number of which are known carcinogens including benzo(a)pyrene, and the concentration of heavy metal contaminants including arsenic, cadmium, and lead.

The Nevada Division of Environmental Protection believes that the site has been sufficiently characterized to determine that the site is a recognized environmental condition due to the release or threat of release of hazardous substances which needs to be addressed prior to development of the area by the Town of Hawthorne. Sufficient characterization also exists to implement a cleanup plan which would be protective of human health and the environment with regards to the pathways of potential exposure.

**C. Other Landfill Studies**

Since landfills, especially old landfills, contain a variety of wastes it becomes difficult to develop a sampling plan to characterize the full range of contaminants that have been disposed there. Usually, landfill sampling is done on leachates, surrounding soils, and groundwater rather than the wastes in order to determine the mobility of contaminants

and the likelihood that the landfill poses a threat to human health through various exposure pathways. Fortunately, large amounts of data have been collected on landfills in Nevada similar to the old Hawthorne landfill to make conclusions about the types of threat it is believed to pose.

*C1. Babbitt Landfill*

The town of Babbitt, located just north of Hawthorne at what is now considered part of the Hawthorne Army Depot, was at one point roughly the size of Hawthorne. Babbitt housed military families and workers from the nearby Hawthorne ammunition plant. The town of Babbitt operated a separate municipal waste landfill approximately one mile northeast of the old Hawthorne landfill. All existing documentation and historic information sources indicate that the Babbitt landfill accepted similar wastes as the Hawthorne landfill and used the same disposal procedures (burning in trenches followed by burial).

The US Army Corps of Engineers administered an investigation of the landfill under RCRA authorities in 1997; Ecology & Environment, Inc. conducted the sampling. The sampling entailed the collection of ten surface soil grab samples and seventeen subsurface soil samples taken beneath the landfill debris. No waste samples were collected, only native soils. Three groundwater monitoring wells were also installed to determine any possible impacts to drinking water supplies. Soil samples were analyzed for semi-volatile organic compounds, pesticides, polychlorinated biphenyls (PCBs), heavy metals, explosives, total petroleum hydrocarbons (TPH), and polynuclear aromatic hydrocarbons.

Detectable levels of all these compounds were found in both surface and subsurface samples indicating some migration of wastes impacting native soils. However, there were very few detectable hits above the soil remediation criteria as listed in the report with a few notable exceptions. Lead was found to be above the remediation criteria of 100 mg/kg in two surface sample locations. PCBs were also above the remediation criteria in one surface sample. No groundwater impacts associated with the landfill were discovered.

The report concluded that the samples above the remediation criteria did not indicate the likelihood of "bulk hazardous waste disposal." This is consistent with our understanding of both landfills: that neither was used for any other activities than the disposal of municipal solid waste. The results of the sampling, however, do show the presence of hazardous substances which can be attributed to municipal solid waste. The old Hawthorne landfill likely has the same contaminants (pesticides, metals, PCBs, and polynuclear aromatic hydrocarbons) present in soils impacted by the historic disposal of household hazardous wastes and burned municipal solid waste.

*C2. Semi-arid Landfill Study*

The Nevada Division of Environmental Protection, Office of Solid Waste has commissioned a study to support its regulations for final covers (compacted low-permeability soil) or alternative final covers (uncompacted native soils) at low risk

municipal waste sites. The study examined the leaching characteristics and likelihood of groundwater contamination at several old landfills in Nevada. These landfills shared similar characteristics to the old Hawthorne landfill: no engineered cover, low annual precipitation, not subject to significant snow accumulation, and no deep waste disposal.

Groundwater impacts were studied at three historic landfills across the State, with at least one in a community in close proximity to Hawthorne. Monitoring wells were installed at the site and sampled for a variety of potential leachate contaminants. The study found a low propensity for leachate migration and no groundwater impacts even where groundwater was found to be relatively shallow.

The study was helpful in demonstrating the effectiveness of alternative covers composed of uncompacted native soil with native vegetation to be as great or greater at preventing waste migration through leachate generation as an engineered, compacted cover. The natural processes of evapo-transpiration and runoff were shown to prevent infiltration especially in such arid conditions as experienced in Hawthorne.

**D. Pathways of Concern**

Based on our understanding of old municipal solid waste landfills in Nevada, as discussed in the preceding sections, a number of pathways of concerns can be evaluated to determine whether the old Hawthorne landfill poses a threat to current or future surrounding residents based on the presence of hazardous substances.

*D1. Direct contact with contaminated soils*

At most municipal solid waste sites, direct contact with contaminated materials is not usually a pathway of concern due to two reasons: the presence of cover materials which make the waste inaccessible and the construction of the landfill in remote, undeveloped areas. The current condition of the old Hawthorne landfill and its location are such that direct contact with contaminated soils is a concern.

The Babbitt landfill study indicated the presence of hazardous substances in surface grab samples (0 to 6 inches); lead and PCBs were both found above soil remediation criteria. The current cover condition of the old Hawthorne landfill is similar to the Babbitt landfill and in some cases may be worse. There are some cells containing burned municipal waste with virtually no cover material, leaving the wastes accessible from the surface. Not only is the cover insufficient in places, but it has been entirely compromised in other places where vandals have dug into the landfill cells in search of old bottles. These activities have resulted in the deposition of waste materials at the surface of the landfill.

The landfill location is less than a half mile from the nearest residence, and with the planned residential development around the landfill, there is no reduction of possible exposure due to the remoteness of the site. Due to the number of roads and paths through the landfill, the site is used frequently for hiking and dog walking purposes by the nearby residences which may increase exposure.

Fortunately, direct contact with wastes can be easily minimized with the construction and maintenance of an appropriate cover using native uncompacted soils which would make the wastes unavailable from the surface of the landfill.

*D2. Direct contact with contaminated leachates*
Even in landfills where waste material is adequately covered, direct contact can remain a problem due to the presence of leachates which can percolate through the cover material. Often the leachate concentrates contaminants found in the waste material and expresses itself on the ground surface where it is not only accessible as an exposure pathway but may also cause native surface soils to become contaminated. Landfills are therefore operated to ensure that water does not come in contact with waste material creating uncontrollable leachate problems.

Nevada is fortunately a very arid environment. With less than 8 inches of precipitation a year and a high evapo-transpiration rate in the vicinity of the old Hawthorne landfill, there is a low likelihood of leachate generation. However, the current condition of the landfill cover may facilitate, rather than prevent, infiltration of meteoric water to landfill waste materials. There is no grading of the cover to prevent run-on from upgradient drainage areas, and there are a number of topographic depressions associated with the landfill cells which may promote the collection of runoff water directly above waste materials.

If the landfill were to be left as is and the surrounding area was developed as residences, there would be a high likelihood that residents could come into contact with leachates containing hazardous substances, especially after meteoric events where water can collect in landfill depressions. To prevent this exposure pathway, the landfill cover should be constructed with sufficient run-on/runoff controls and proper grading.

*D3. Leaching of contaminants to drinking water*
Concerns with leachates at landfills go beyond the direct contact exposure scenario. Leachates may cause problems even where there is no surface expression since they are the most common transport pathway for contaminants in waste materials to reach groundwater drinking water sources.

At the old Hawthorne landfill, even with its insufficient cover, there is a very low likelihood of drinking water contamination. This is due to the depth of groundwater, which is approximately 250 feet below ground surface, and the high evapo-transpiration rates. Still, it is recommended that the cover of the landfill be constructed and maintained in order to minimize water infiltration, and institutional controls be implemented to prevent any activities which may result in the wetting of waste materials.

*D4. Landfill gas production*
Another problem with water infiltrating waste materials is the creation of an environment promoting landfill gas production. However, due to the age of the material, the fact that the waste was burned prior to burial, the arid environment, and the lack of any evidence that great amounts of methane are currently being produced at the site, concerns about

landfill gas are minimal. Similar to the drinking water pathway, it is recommended that the cover of the landfill be constructed and maintained in order to minimize water infiltration, and institutional controls be implemented to prevent any activities which may result in the wetting of waste materials.

*D5. Windblown Particulates*

Even though landfill gas production is not thought to be a concern at the old Hawthorne landfill, a pathway of concern exists which may expose nearby residents to hazardous substances through air migration. Wastes, specifically any ash from incomplete waste combustion, exposed at the site either because of the lack of cover or vandalism have the potential to be distributed as particulate matter. The site is currently uncontrolled, and vandals have unrestricted access to the site with heavy equipment capable of excavating in the landfill trenches in search of old bottles. These activities deposit waste materials directly on the surface of the landfill and are often left uncompacted.

Site access needs to be restricted to prevent vandalism and on-going illegal dumping. It is recommended that fencing be erected and major roads gated to prevent vehicle access. Access through pedestrian trails could still be provided, but some outreach activities should be conducted in order to educate the citizens about the Town of Hawthorne's efforts to clean and maintain the site. This would discourage vandalism and illegal dumping..

**E. Conclusion**

Due to the likely presence of hazardous substances, lack of sufficient cover, ready access to the site, and proximity to residents, the State of Nevada would require that the Town of Hawthorne undertake cleanup activities at their old landfill. State regulations require these old landfills (closed prior to the enactment of Subtitle D) to maintain a cover to be protective of human health. The old Hawthorne landfill does not currently meet these State requirements and needs to be cleaned up accordingly.

The old Hawthorne landfill is classified as a low-risk municipal waste landfill because of the low likelihood of water infiltration and leachate generation, but it is a high-risk site for the direct contact and airborne particulate exposure pathways. It is therefore appropriate to allow an alternative cover of native soil with native vegetation rather than an engineered cap of low conductivity material. Surface wastes should either be consolidated and buried on-site or taken to an off-site facility as appropriate. The soil material used for the cover should be of such thickness and composition to absorb precipitation without significant leakage into the waste mass. The cover should be designed with drainage control structures that prevent surface water runon and graded to eliminate depressions and promote runoff. It should be revegetated during the next fall planting season.

Fencing and signage should be erected to prevent vehicular access and illegal dumping. A community notification process should be enacted to remind community members that dumping is illegal at the old landfill, and trash should be taken to the permitted facility

just down the road. Both these actions will help to maintain the cover and prevent future contamination and solid waste problems at the landfill.

It is our sincere hope that the Brownfields Program can provide its resources to the Town of Hawthorne for this much-needed cleanup. The State of Nevada feels that Hawthorne and the landfill project embody the ideals of the Brownfields Program. This project has truly arisen out of a community desire to improve their own quality-of-life by using government programs to shape their town's future for the better.