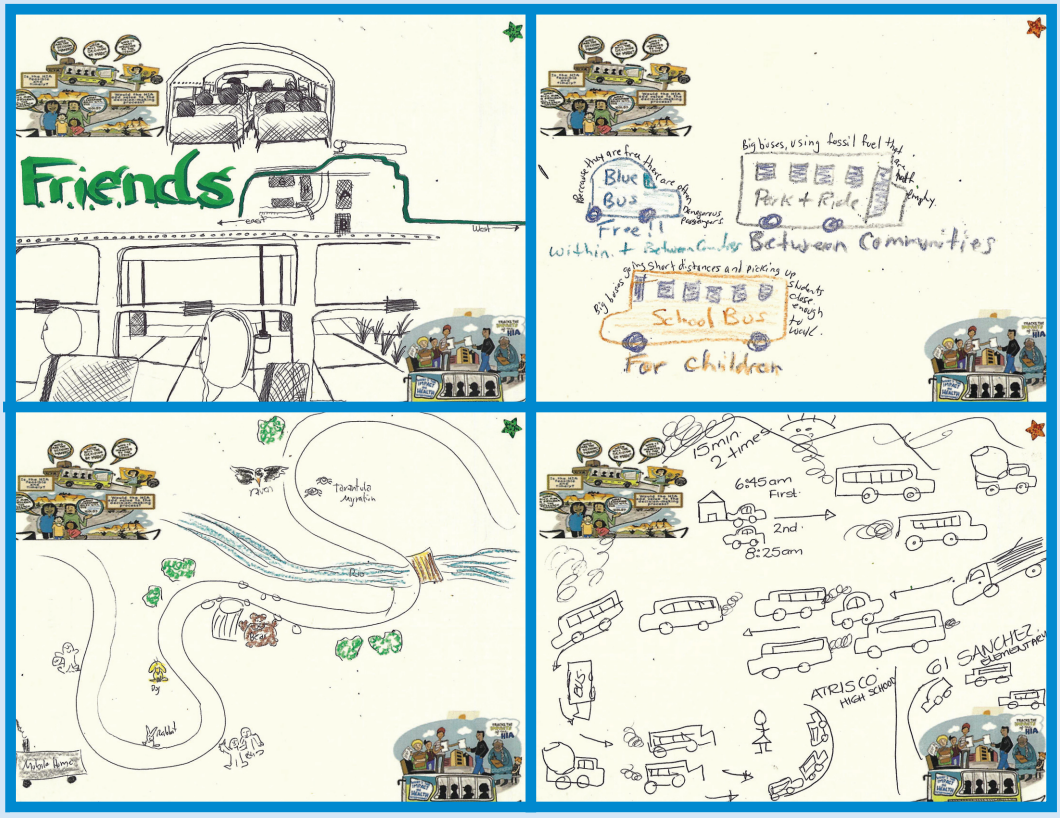
TRANSPORTING NEW MEXICAN CHILDREN TOWARD THE FUTURE:



AN ASSESSMENT OF

THE HEALTH IMPACTS OF MOVING TO ELECTRIC SCHOOL BUSES

ON SCHOOL-AGED CHILDREN AND THEIR FAMILIES

CONSERVATION VOTERS NEW MEXICO EDUCATION FUND | JANUARY 2020

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COVER ART:

These drawings represent what families and students see and experience when taking the bus to school or work. They were drawn during the Community Convening in February 2019.

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TABLE OF CONTENTS

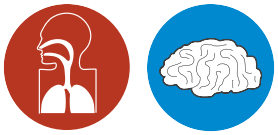
TABLE OF FIGURES

EXECUTIVE SUMMARY

Many of New Mexico's school-aged children ride a diesel-fueled bus to attend school each day. Approximately 166,000 children ride school buses to over 89 school districts, which serve more than 300,000 students, over half of whom are Latino, Indigenous or African American/Black. When an engine combusts diesel fuel, it emits exhaust that contains a mixture of gases, chemicals and fine particles. The fine particles within diesel exhaust are known as diesel particulate matter, 90% of which are ultrafine particles, or those particles 0.1 microns or less in size. They are the most damaging part of diesel emissions because, when inhaled, they bypass the body's natural defense systems and are linked to increases in cancer and asthma or other respiratory illnesses (U.S. EPA, 2019a). A still highly relevant 2001 study exploring the adverse health effects from exposure to diesel exhaust from school buses found that a child riding a diesel-fueled school bus might be exposed to four times the levels of toxic diesel exhaust as a person being transported in a car (Solomon et al., 2001). These exposures have not changed, in many cases, over the past 18 years, as some school districts still rely on polluting diesel school buses to transport children, which expose children riding them to higher levels of pollutants than their newer counterparts. For specific communities, often communities of color that are already burdened by poverty, legacy pollutants—those pollutants that still exist long after having been released—this exposure represents an additional harm above and beyond the existing conditions. In discussions with community members, we learned that families living at or below the poverty line often live farther away from their public school. These longer distances lead to a higher reliance on public transportation options, such as school buses, resulting in longer bus rides and thus, higher diesel exposure (Community Forum, March 2019). This means that children who live in poverty and rely on school bus transportation are more likely to be exposed to diesel exhaust for longer periods of time, which can lead to chronic illnesses such as asthma. Asthmatic children are more likely to miss school due to respiratory health issues. Families of asthmatic children face having to miss work and experience high related medical costs, which impacts their income and job security.

In response to community concerns about the impacts that diesel school bus emissions have on the health and well-being of school-aged children and their families, CVNM Education Fund initiated this health impact assessment. This assessment explores how an investment in electric school buses may impact physical and mental health, educational attainment, and income and job security for school-aged children and their families living in the target communities of South Valley, Westgate Heights/Vecinos, Gallup and Española, and the potential benefits that could result from an investment in electrification of school buses.

HOW WOULD ADOPTING ELECTRIC SCHOOL BUSES IMPACT:



PHYSICAL AND MENTAL HEALTH

- A decrease in respiratory illnesses or episodes in children
- A resulting decrease in stress, depression, and anxiety in the parents who care for their sick children, and the associated increase in job insecurity
- An increase in student well-being due to stronger social networks and school performance, and fewer days of missed school

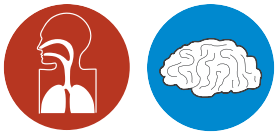
EDUCATIONAL ATTAINMENT

- A decrease in missed days of school due to respiratory illness by eliminating the presence of a significant trigger of asthma (e.g., diesel)—the leading cause of missed school days
- An increase in school performance indicators (e.g., test scores, grade point averages) when children miss less school
- A resulting increase in rates of high school graduation and college admission

INCOME AND JOB SECURITY

- A decrease in sick or unpaid leave from work required by parents by eliminating a key trigger of asthma (diesel exhaust from school buses)—the leading cause of missed school days among school-aged children
- An increase in parent job performance and job security and a decrease in economic or emotional stress when parents do not have to miss work to care for sick children
- An increase in critical income necessary for family survival when parents do not have to miss work to care for sick children
- An increase in employer satisfaction due to a consistent work force presence and strong work product when parents do not have to miss work to care for sick children

Emerging from the analysis conducted for this HIA, this assessment makes the following recommendations:



PHYSICAL AND MENTAL HEALTH RECOMMENDATIONS

1. School districts should enforce bus idling restrictions to ensure that students attending their schools and the surrounding communities do not experience unnecessary exposure to air pollution from diesel school buses.

2. School districts should work to replace diesel-powered school buses with electric-powered (zero-emission) school buses, prioritizing communities with a large percentage of low-in come, Latino/Hispanic, or Indigenous populations, in particular those whose students are burdened by long bus rides from rural communities. School districts should

    a. use their annual budgets to replace diesel school buses with electric school buses;
    b. use their budgets to purchase and install electric infrastructure, such as solar panels, storage batteries, and charging stations, to accommodate electric school buses;
    c. apply for funding from the Volkswagen settlement to replace diesel school buses with electric school buses; and
    d. monitor other funding sources, including the U.S. EPA's Clean School Bus USA funding, to continue working toward the full replacement of diesel buses with electric school buses.

3. School officials should work with their school bus contractors to initiate mitigation efforts immediately to decrease exposure while the transition from diesel to electric is underway. These efforts can include installing filters on diesel buses to minimize diesel exposure for riders of diesel buses and ensuring that bus drivers seat students at the front of the bus first (where diesel levels are lower).

4. The New Mexico Environment Department, in administering the funds under the Volkswagen settlement, should encourage the replacement of diesel school buses with electric school buses.

5. The New Mexico Environment Department should work with the Navajo Nation to obtain and make publicly available any air quality monitoring data generated in Navajo lands.

EDUCATIONAL ATTAINMENT RECOMMENDATIONS

1. School districts should work to replace diesel-powered school buses with electric-powered (zero-emission) school buses, prioritizing communities with a large percentage of low-income, Latino/Hispanic, or Indigenous populations, in particular those whose students are burdened by long bus rides from rural communities. School districts should

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    b) use their budgets to purchase and install electric infrastructure, such as solar panels, storage batteries, and charging stations, to accommodate electric school buses;
    c) apply for funding from the Volkswagen settlement to replace diesel school buses with electric school buses; and
    d) monitor other funding sources, including the U.S. EPA's Clean School Bus USA funding, to continue working toward the full replacement of diesel buses with electric school buses.

2. School districts should ensure that students in grades K–12 have access to school-based health centers to provide for the existing healthcare needs of students so that they do not miss school unnecessarily.

3. School districts should fully fund certified nursing staff positions with certified nurses (not nursing aides) in schools, especially those that are in communities with poorer air quality or high rates of childhood asthma or disabilities, so that they have access to readily available in-school care and do not miss school unnecessarily.

4. School districts should fund after-school tutoring programs to assist students who miss school due to illness, such as asthma, so they may stay up-to-date on their assignments/workload. They should prioritize funding for schools in communities where diesel school buses require students to ride 30 minutes or more to and from school, as these bus rides represent a clear trigger of asthma.

INCOME AND JOB SECURITY RECOMMENDATIONS

1. School districts should work to replace diesel-powered school buses with electric-powered (zero-emission) school buses, prioritizing communities with a large percentage of low-income, Latino/Hispanic, or Indigenous populations, in particular those whose students are burdened by long bus rides from rural communities. School districts should

   a) use their annual budgets to replace diesel school buses with electric school buses;
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   d) monitor other funding sources, including the U.S. EPA's Clean School Bus USA funding, to continue working toward the full replacement of diesel buses with electric school buses.

I. INTRODUCTION

Conservation Voters New Mexico (CVNM) Education Fund is a statewide, nonpartisan, nonprofit organization committed to engaging the people of New Mexico in our long-standing shared values of protecting our air, land, and water and the health of our communities. CVNM Education Fund is committed to supporting and elevating community-designed solutions that address environmental pollution, particularly from pollutants with effects that linger long after the initial exposure, and other health and environmental problems. As part of our work, we promote leadership development, civic engagement, and community involvement in the decision-making process to advocate for change.

During the course of CVNM Education Fund's community-based work, volunteers expressed concerns about the adverse impacts of diesel exhaust emissions from school buses on the health and well-being of their community. Through a series of community conversations, CVNM staff determined that the adverse impacts of diesel emissions on physical and mental health, and consequently on educational attainment and income and job security, were particularly urgent concerns in many local communities. CVNM therefore decided to conduct a detailed assessment of these impacts and how these impacts might be mitigated. This health impact assessment explores how replacing diesel-powered school buses with electric-powered school buses could improve these key aspects of the health and well-being of school-aged children and their families in select communities within New Mexico.

BACKGROUND ON THE ISSUE

Diesel exhaust from school buses.

Many of New Mexico's school-aged children ride a diesel-fueled bus to attend school each day. In the target communities for this assessment—South Valley, Westgate, Gallup, and Española—many children are riding long distances, for hours per day, just to attend school. A still highly relevant 2001 study evaluating the health impacts from diesel exhaust from school buses found that a child riding a diesel-fueled school bus might be exposed to four times the levels of toxic (Solomon et al., 2001). This situation has not changed, in many cases, over the past 18 years, as some school districts still rely on polluting diesel school buses to transport children. In 2020 alone, the New Mexico

Public Education Department (PED) needs to replace 387 school buses in their bus fleet, or 18.7%, due to concerns like bus age. PED budgets for bus replacements each year as vehicles age and continue to need replacement (Bedeaux, 2019). Required by statute, school buses are replaced once they reach a twelve year cycle of use (NMSA 22-8-27). Based on discussions with community members, we learned that families living at or below the poverty line often live farther away from their public schools, which leads to a higher reliance on public transportation options, such as school buses. As a result, children from these families take longer bus rides and are thus exposed to greater amounts of diesel exhaust (Community Forum, March 2019). Because children who live in poverty and rely on school bus transportation are more likely to be exposed to diesel exhaust for longer periods of time, they are prone to chronic respiratory illnesses such as asthma. Asthmatic children are more likely to miss school due to their diminished respiratory health. And family members of asthmatic children miss work more frequently and incur high related medical expenses, both of which negatively affect their income and job security. Taken together, investing in electric school buses to replace older diesel school buses may lead to dramatic improvements in the physical and mental health, income and job security, and educational attainment of school-aged children and their families. This assessment therefore explores how an investment in electric school buses can impact these key aspects of the health and well-being of families living in the target communities and attending New Mexico public schools.

WHY A HEALTH IMPACT ASSESSMENT?

The Health Impact Assessment (HIA) process facilitates strong community engagement in data collection, policy analysis and development, and action around key issues of concern. This HIA's focus on assessing the benefit of electrifying school buses within environmental justice communities, or those communities overburdened by environmental harms, aligns with CVNM Education Fund's mission, as it provides an avenue for our community to identify and develop a solution to address asthma and respiratory illnesses caused by diesel fuel.

Health Impact Assessment is a six-step systematic process that

- determines the potential effects of a proposed policy, plan, or project on the health of a population;
- engages local community partners and integrates their perspectives and voices;
- employs varied data sources and analytic methods;
- determines the distribution of effects on target populations; and
- provides recommendations on monitoring and managing determined effects

(National Research Council of the National Academies, 2011).

This health impact assessment has the following goals:

1. **Assess the potential health and well-being impacts on school-aged children and their families if school districts within the target neighborhoods transition their school bus fleet from diesel to electric.**

2. **Expand community engagement in the decision-making process within each of the four target communities identified in the assessment by working collectively on the galvanizing and unifying issue of school bus electrification.**

Community members from McKinley County explain artwork that depicts their vision for the community, and traditional way of life. Photo credit: M. Tyanne Benallie

REPORT LAYOUT

Section II. Methods (page 14) summarizes the HIA framework by outlining the process by which the project team conducted this Health Impact Assessment. Section III. Existing Conditions (page 15) presents local conditions for each of the communities of interest through Community Profiles, integrating peer-reviewed literature, population statistics, and locally sourced data. Section IV. Impact of Electric School Buses on Physical and Mental Health (page 53) explores how transitioning school buses from diesel to electric might improve the physical and mental health of students and their families who attend the selected communities' schools. Key recommendations are incorporated into this section. Section V. Impact of Electric School Buses on Educational Attainment (page 57) explores how transitioning school buses from diesel to electric might improve educational attainment for the students attending the selected communities' schools. Key recommendations are also incorporated into this section. Section VI. Impact of Electric School Buses on Income and Job Security (page 62) explores how transitioning school buses from diesel to electric might improve income and job security for the parents of students attending the selected communities' schools. Key recommendations are also incorporated into this section. Section VII. Summary of Findings and Recommendations (page 65) lays out the key recommendations reached through this assessment. Section VIII. Conclusion (page 69) provides key conclusive comments to consider upon reviewing the entire assessment and its recommendations.

II. METHODOLOGY

Conservation Voters New Mexico (CVNM) Education Fund used the following methods to conduct this Health Impact Assessment (HIA):

1 **Screening: The screening process assesses the need and benefits of conducting an HIA.** The idea to work on this issue emerged from a desire to unify CVNM Education Fund work occurring across each of the identified communities in this assessment. The volunteer-driven policy and community-building work occurring in Bernalillo, McKinley, and Rio Arriba counties is tied to the goals identified in this Health Impact Assessment. Through community-level engagement (e.g., community forums, focus groups), this issue emerged as a unifying concern across each of the communities.

2 **Scoping: The scoping process establishes which health impacts to evaluate, the methods for analysis, and a work plan for the assessment.** CVNM Education Fund used the HIA process to bring programs together in order to unify the goals of the communities represented by their key programs. Working collaboratively, with technical assistance from the New Mexico Health Equity Partners—an initiative at the Santa Fe Community Foundation that works to build community capacity to engage in HIA processes—the project team developed research questions to guide the development of this HIA (See **Appendix I: Health Impact Assessment Research Questions**). Building on that work, in February 2019, CVNM Education Fund convened a two-day environmental justice meeting for a cross-cultural exchange among all communities represented by the three CVNM Education Fund programs. As part of the two-day session, the communities were engaged in activities to elicit their goals for the HIA through the creation of Body Collages (Figure 2, page 19 Figure 19, page 37; and Figure 26, page 47) and to develop a health pathway diagram to define and illustrate the steps from decision to health benefits (See **Appendix II: Health Impact Assessment Pathway Diagram**). Ultimately, the project team agreed to assess the benefits of replacing diesel with electric school buses on **physical and mental health, educational attainment, and income and job security** for school-aged children and their families. These issues were further explored through a series of community forums and focus groups held in each of the target communities. During these conversations with community members, linguistic interpretation, including Navajo and Spanish, was provided to ensure that all voices were heard equally. Members shared their experiences related to these three topic areas to ground the information explored in the assessment portion of the HIA.

3 **Assessment: The assessment portion of the Health Impact Assessment provides (1) a profile of the existing health conditions in the community relevant to the assessment, and (2) an evaluation of potential health impacts.** For this HIA, the project team conducted a detailed literature review, collected and reviewed secondary quantitative data, and collected and integrated primary community qualitative data (gathered through community forums held in the

identified communities) to better understand the existing health conditions of the community and articulate them in this assessment. The project team reviewed and integrated these data to assess the overall impacts on health of transitioning away from diesel school buses to new, electric buses.

4 **Recommendations: The recommendations portion of the HIA provides strategies to manage identified adverse health impacts and maximize benefits to health.** As a final step to this HIA, the team developed a list of practical solutions based on the findings. Draft recommendations emerged from conversations during a February 2019 community forum. These recommendations were then vetted through a series of focus groups held in each community in August 2019. This report includes recommendations for physical and mental health, educational attainment, and income and job security for school-aged children and their families.

5 **Reporting: The reporting portion of the HIA develops the HIA report and communicates findings and recommendations.** The CVNM Education Fund project team will publish the report, post it on the organization website, and disseminate the report to decision-makers, other key stakeholders in the identified communities, and other interested members of the public. The CVNM Education Fund team will also hold a series of meetings with community stakeholders to discuss the report and its findings. CVNM Education Fund will integrate the findings of this assessment into its policy and advocacy activities in the identified communities.

6 **Monitoring and Evaluation: The monitoring and evaluation step of the HIA follows the real-world effects of the HIA report after it has been completed.** It tracks the impacts of the HIA on decision-making and the results of those decisions on the health of children and families in the identified communities. As a final and ongoing step to this HIA process, the project team will continue to monitor progress on implementing the recommendations made in this report, as well as track progress on children's health due to resulting policy changes.

III. EXISTING CONDITIONS

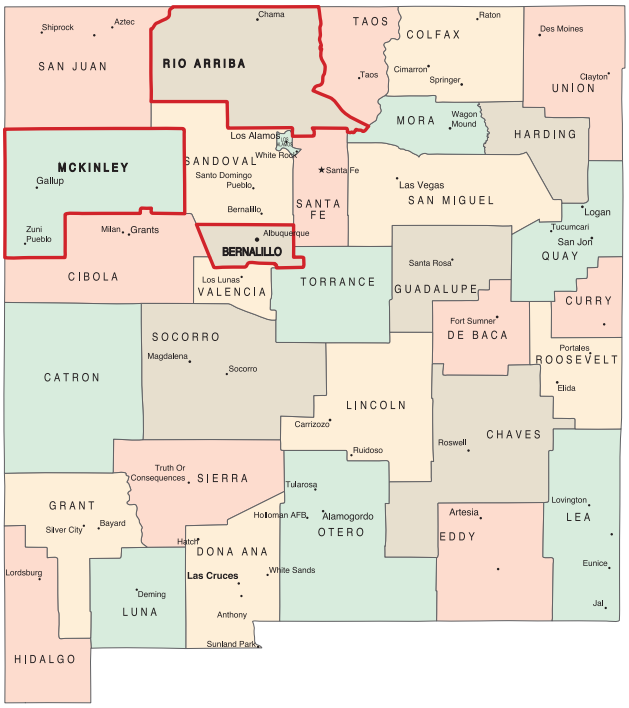
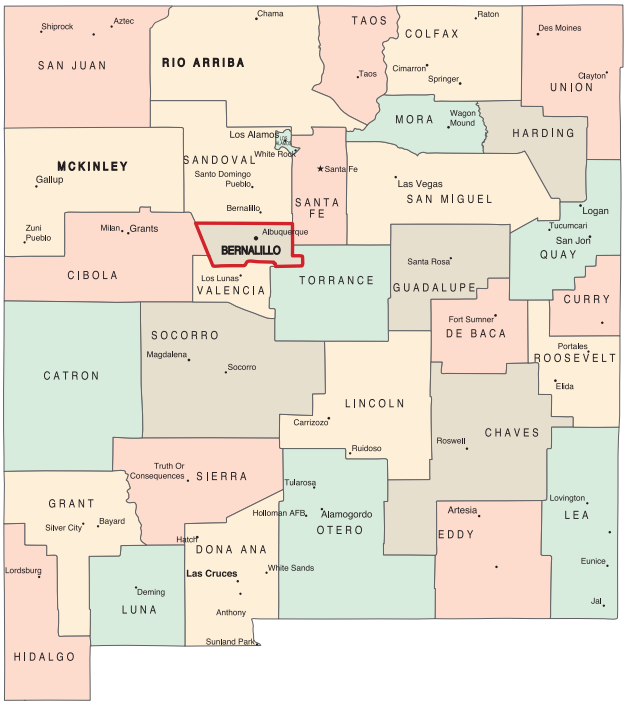


FIGURE 1: COUNTY BOUNDARIES WITHIN THE STATE OF NEW MEXICO

The geographic focus for this Health Impact Assessment is neighborhoods within three key New Mexico Counties—Bernalillo, McKinley, and Rio Arriba (Figure 1). Specifically, this study examines data for the South Valley and Westgate (including Westgate Heights and Westgate Vecinos) neighborhoods in the City of Albuquerque, Bernalillo County; the community of Gallup in McKinley County; and the community of Española in Rio Arriba County. These communities were selected because of their demographic characteristics—they are predominantly communities of color, with higher than average poverty rates—and because of their relatively high air pollution levels, both from transportation sources, such as diesel buses, and from industrial operations. By focusing on these communities, this assessment explores how underlying individual and institutional factors, such as poverty, educational attainment, income, job availability, and employment access, can exacerbate the adverse effects of air pollution.

Bernalillo County, New Mexico



Bernalillo County includes the City of Albuquerque, the largest city in the state. Most of the county's population resides in Albuquerque; Albuquerque has a population of 559,270, while Bernalillo County has a population of 676,953 as of the 2010 U.S. Census. Albuquerque's school district is also the largest in the state, with 139 schools educating approximately 95,000 students (U.S. Department of Education, 2013). Within the city, there is great diversity in neighborhoods' demographics and health outcomes. Although rich in cultural diversity, many Albuquerque neighborhoods experience high rates of poverty and disinvestment (Central Corridor Neighborhood Study, 2017).[1] For example, of the 33 neighborhoods within Albuquerque, the two neighborhoods selected for this assessment— South Valley, Westgate Heights/Vecinos—rank at the bottom in combined indicators for healthy communities based on the U.S. Housing and Urban Development Healthy Communities Assessment Tool. This tool considers "availability of fresh food, park and green space, affordable housing and access to transportation, education, and employment" in its assessment (U.S. Housing and Urban Development Healthy Communities Assessment Tool, 2018). As part of the kick-off of this Health Impact Assessment, community members provided information through artwork, specifically through the collaborative creation of body collages with prompts such as "What does health mean to you?" (Figure 2). What follows are air pollution exposure, physical and mental health, educational attainment, and income and job security indicators for each of the neighborhoods in Bernalillo County selected for inclusion in this assessment. Where neighborhood-level data is unavailable, Bernalillo County data is used as a proxy.

1 The study created community profiles from social determinants of health measures using HUD's Healthy Communities Assessment Tool (HCAT): http://hcat.healthmattersnm.org/indicators.

Bernalillo County, New Mexico

FIGURE 2: BODY COLLAGE FOR BERNALILLO COUNTY FROM HIA KICKOFF, CONVENING FEBRUARY 2019

The right side of the body collage illustrates the negative impacts on health (e.g., pollution, trash, not caring for the land, climate change), then how the transition from diesel buses to electric impacts our families and communities. The bottom of the body collage shows the roots which represents values and culture and reclaiming of the land. **The eye represents that people do not always see clearly and tend to make bad choices, but that there is benefit in thinking ahead.**

South Valley Neighborhood, Albuquerque

Map showing location of South Valley neighborhood in Bernalillo County.

SOUTH VALLEY: DEMOGRAPHICS

The South Valley neighborhood, located in Albuquerque, had an estimated population of 40,976 as of the 2010 U.S. Census, with a median age of approximately 40 years old (U.S. Census, 2010a). The population of South Valley is 81% Hispanic or Latino, 16% White, and 2% American Indian/Alaska Native (Figure 3). Of the 13,802 households within the South Valley neighborhood, approximately 32% had school-aged children living in the home. Approximately 54% of those people living in the neighborhood speak a language other than English (Viz Builder, 2019a).

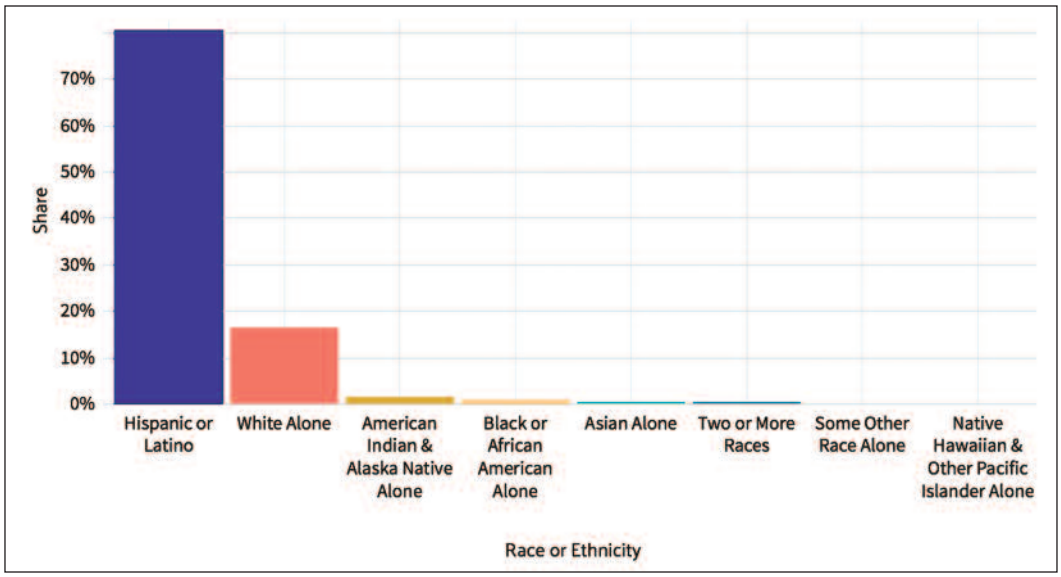


FIGURE 3: RACE/ETHNICITY DATA FOR THE SOUTH VALLEY NEIGHBORHOOD OF ALBUQUERQUE AS OF 2017 (VIZ BUILDER, 2019A)

SOUTH VALLEY: AIR POLLUTION

Diesel School Bus Pollution

Children riding to and from school on a school bus are exposed to diesel exhaust due to fumes leaking from the engine compartment into the bus cabin, fumes entering the bus cabin through open windows, and fumes accumulating around the bus while children are waiting for, boarding, and debarking the bus. Children riding a school bus are also exposed to exhaust emissions from other vehicles on the road, which enters the bus through open windows (Fitz et al., 2006). According to a landmark 2001 study examining the impacts of diesel school bus emissions on community and children's health:

School bus yards in South Valley neighborhood of Bernalillo County. Photo credit: Latasha James.

A child riding inside of a diesel school bus may be exposed to as much as **4 times the level of toxic diesel exhaust as someone riding in a car ahead of it.** Under federal law, these exposures translate into a significant risk of cancer to children. In fact, these exposures pose as much as 23 to 46 times the cancer risk level considered significant under federal law (Solomon et. al., 2001).

In discussions with community members during an August 2019 community focus group, parents explained that their children ride the school bus between 30 and 75 minutes each way. Such lengthy bus trips result in high diesel exposure to these children.

Exposure to pollution from school bus exhaust is not limited to the children who ride the buses. Despite anti-idling regulations that have been put into place, parents report that school buses often idle in front of schools before school starts and after school ends, during drop off and pick up. This pollution exposes the entire school population and surrounding community. In a community meeting held on February 24, 2019, volunteers from each of the target communities provided comments and observations on how diesel emissions have affected their health and the health of their children. Responses ranged from stress and asthma to emotional or spiritual disruptions (Figure 4).

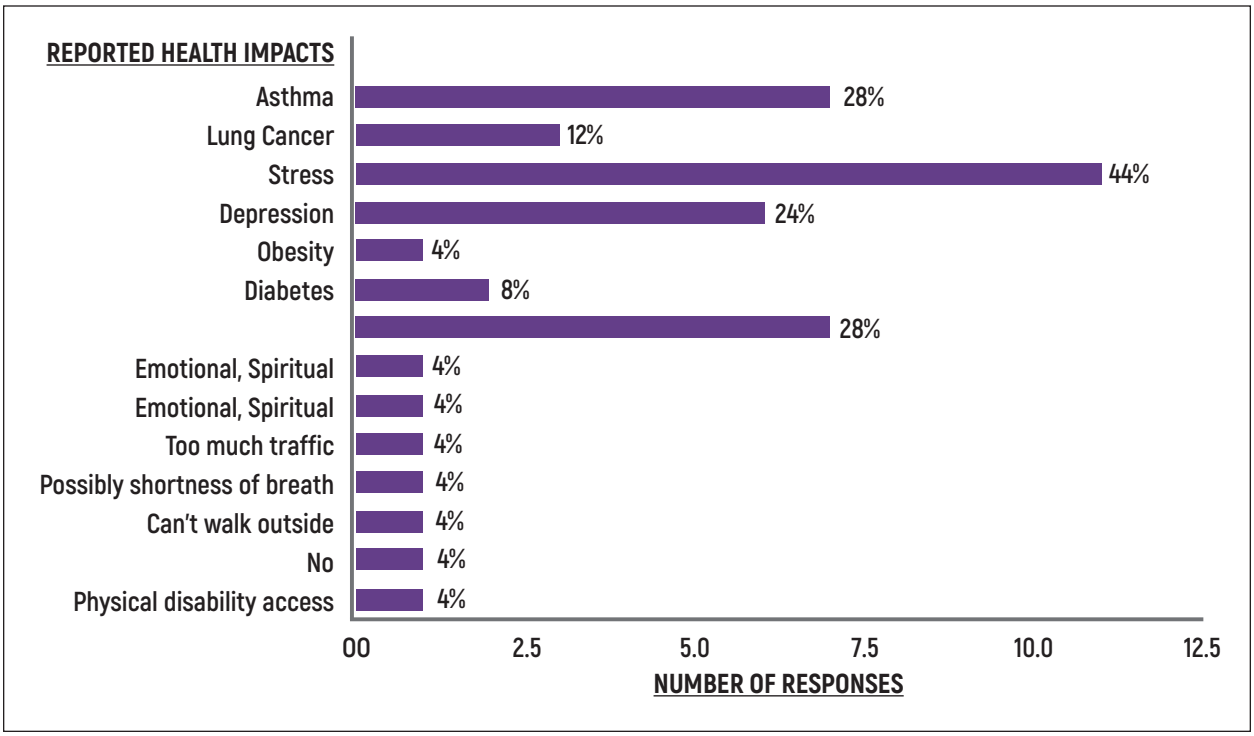


FIGURE 4: RESPONSE TO "HOW HAVE DIESEL EMISSIONS IN YOUR AREA AFFECTED YOUR HEALTH?"

Background Pollution

When an engine combusts diesel fuel, it emits exhaust that contains a mixture of gases, chemicals, and fine particles. These final particles within diesel exhaust are known as diesel particulate matter, 90% of which are ultrafine particles, or those particles 0.1 microns or less in size. These are most damaging because, when inhaled, they bypass the body's natural defense systems and are linked to increases in cancer, asthma, and other respiratory illnesses (U.S. EPA, 2019a). These gases, chemicals, and fine particles also contribute to the ambient air pollution in the region. Ambient air quality is monitored by the City of Albuquerque's Environmental Health Program. There are five ambient air quality monitors in the city, one of which is located within the community of South Valley (201 Prosperity Avenue SE, 87105). This monitoring station measures: (1) carbon monoxide; (2) ozone; (3) fine particulate matter (between 2.5 and 10 microns in diameter, or PM10); (4) very fine particulate matter (less than 2.5 microns in diameter, or PM2.5) (City of Albuquerque, 2019). Since 2000, this monitoring station has shown pollutant levels that are in compliance with the national air quality standards, except for very fine particulate matter (PM2.5). Data provided by the City of Albuquerque Air Monitoring Program show that PM2.5 exceedances did occur throughout 2010–2019. PM2.5 is particularly injurious to human health, because it comprises very fine particles that can penetrate deeply into the lungs. By way of

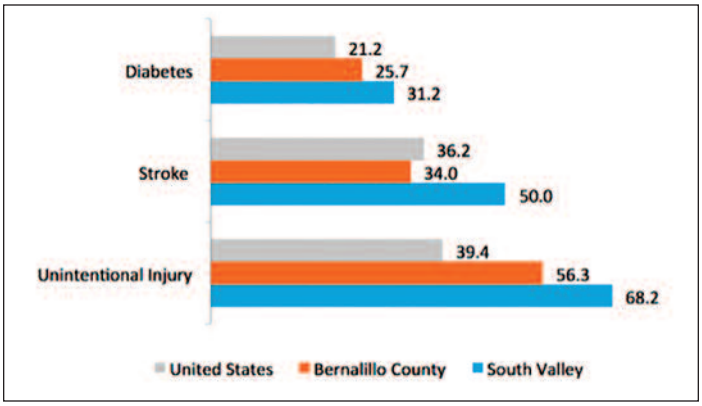
comparison, a human hair is approximately 100 microns in diameter, or about 40 times the diameter of the largest PM2.5 particles. The tiny size of the particulates means they can move directly into the bloodstream, allowing the body to interact with complex chemicals adhered to the particulates (American Lung Association, 2013). While monitoring data is important, placement of monitors is important, as community hot spots for air pollution are not always captured, as is likely the case with diesel buses that queue near schools at specific times of day, emitting noxious diesel exhaust.

With respect to other legacy pollutants, or those pollutants that remain in the environment long after they have been released, there are several Superfund Sites in South Valley. One site, the AT&SF Tie Treater site, which comprises 89 acres located at 3300 Second Street, SW Albuquerque, NM, was added to the National Priorities List (NPL) for Superfund cleanup in 1994. This site is owned by Burlington Northern Santa Fe Railway Co. (formerly AT&SF Railway), which is the only responsible party. It started as a wood-treating plant, operated on-site from 1908 until 1972. Operations used creosote and oil mixtures for manufacturing of pressure-treated wood products. In 1972, the plant was dismantled, and only the wastewater reservoir and sump remained on site. Operations contaminated soil and groundwater. Routine inspections, groundwater treatment, and groundwater monitoring are ongoing, and residents remain concerned about contamination (U.S. EPA, 2019b). During an August 2019 community focus group, community residents expressed concern about the vast number of factories, oil drum storage areas, and other industrial facilities in their community as possible additional sources of background pollution. The combination of diesel school bus emissions with other legacy pollutants puts school-aged children and their families at greater risk, which could result in negative consequences for their health and well-being.

SOUTH VALLEY: PHYSICAL AND MENTAL HEALTH

Overall Health

The South Valley generally has good access to health insurance—over 85% of the population has health care coverage (Viz Builder, 2019a). Despite this, almost 15% of adults in the community have not seen a medical care provider due to cost, demonstrating that access to health care services is, in fact, an issue for the community (U.S. Department of Health and Human Services BRFSS, 2013). While life expectancy in South Valley is closely aligned with that of the United States, mortality rates for diabetes, stroke, and unintentional injury are much higher in the South Valley (Figure 5). These conditions point to an underlying burden of disease facing the population living in South Valley. During community focus groups held in August 2019, community



FIGUR E 5: DEATHS BY CAUSE PER 100,000 POPULATION, AGE ADJUSTED (SOURCE: UNM EVALUATION LAB, 2016)

members expressed concern about the overall health and well-being of residents, particularly that of students, noting the lack of access to healthy food, overpopulated schools, drug abuse, and the impacts of pollution on health.

Asthma

When considering the impacts of diesel exhaust from school buses on health, asthma is one of the primary health concerns. While asthma data is unavailable at the community level, county and statewide data is available. Asthma is one of the more common chronic diseases in the state, with an estimated 45,503 children having been "ever diagnosed" with the illness in New Mexico. According to a 2009 public education report, Managing Asthma in New Mexico Schools, "Asthma is a chronic, inflammatory condition of the lungs that makes it difficult to breathe. Asthma is characterized by excessive sensitivity of the lungs to various stimuli. Triggers range from viral infections to allergies, to irritating gases and particles in the air" (State of New Mexico Public Education Department, 2009). The report also notes that children with asthma are more likely to miss school due to their illness and are likely to have an overall reduced quality of life if the illness is not well controlled (e.g., the child is not under the regular care of a medical provider). According to the U.S. Department of Health and Human Services,

> Asthma is also costly, with expenses from routine checkups, emergency department visits, hospitalizations, and medications putting a significant burden on families, the health care sector, and the economy. Though it cannot be cured, asthma can be controlled through quality health care, appropriate medications, and good self-management skills. When asthma is controlled, people with the disease have few, if any, symptoms, and can live normal and productive lives (U.S. Department of Health and Human Services BRFSS, 2013).

A comparison of the statewide childhood asthma prevalence rate (10.5%) with that of the United States (13.5%) shows that New Mexico's overall burden of disease may not be higher than the

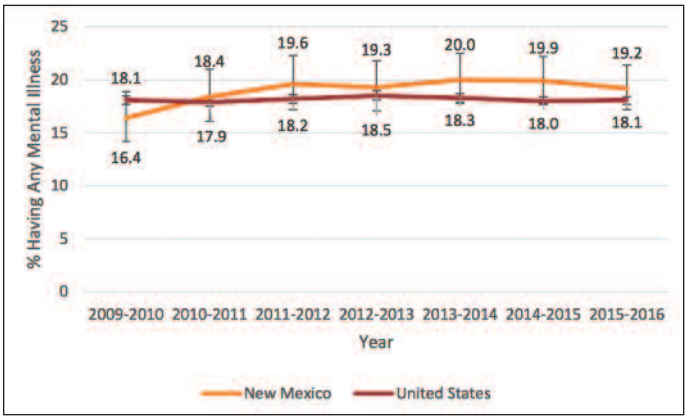


FIGURE 6: ANY MENTAL ILLNESS IN THE PAST YEAR, 18+ YEARS, NEW MEXICO AND THE UNITED STATES 2009-2016 (SOURCE: NEW MEXICO DEPARTMENT OF HEALTH, 2018)

national average. However, there is likely variability across communities within the state. Asthma is not a reportable disease, and it can be difficult to diagnose, making estimates of actual asthma rates challenging to make and leaving many children undiagnosed (New Mexico Department of Public Health, 2019). Albuquerque Public Schools data for 2018–2019 show that just over 20% of the student ailments are due to asthma across their 169 campuses (10,170 asthma-related incidents of the 49,993 total). According to the Office of Minority Health, Hispanics are two times as likely to both visit an emergency room for asthma and die from asthma, as compared to non-Hispanic whites (U.S. Department of Health and Human Services, 2019). Further, there is evidence to suggest that Hispanics tend to underreport asthma due to parents lacking knowledge about signs and symptoms of asthma. The community thus experiences underreporting of the disease, a lack of access to medical care in general, and the possible underdiagnosis of asthma by physicians for fear of eroding the patient-doctor relationship by being the one to make the diagnosis (Medscape, 2010). Given the high percentage of Latinos/Hispanics living in the South Valley community, this creates a higher risk of asthma exacerbations at baseline than for other communities in the Albuquerque area with different demographics. Further, specific neighborhoods within the state may experience higher-than- average disease burdens due to the increased presence of air pollution, lack of access to quality medical care, and other asthma triggers or other disproportionate impacts typical in environmental justice communities. For example, according to a 2007 study on cumulative risk in environmental justice communities, “The risk, for example, of a child being lead poisoned, developing asthma, having emergency asthma events, or being injured or disabled is heightened if one is low-income, minority, and living in poor housing” (Hynes and Lopez, 2007). This is more evident if you look at localized data within the state of New Mexico. For example, the asthma hospitalization rates in Bernalillo County are identified as a “reason for concern” by the state as asthma hospitalizations per 10,000 people within the County are 17.6 as compared to 14.4 statewide (New Mexico Department of Public Health, 2019).

Mental Health

According to the World Health Organization (WHO) there is, "no health without mental health." Mental health refers to a broad array of activities directly or indirectly related to mental well-being. It is part of the WHO's definition of health as a state of complete physical, mental, and social well-being, and not merely the absence of disease (World Health Organization, 2005). According to a 2018 report on the state of mental health in New Mexico, "the prevalence of having any mental illness in the past year among both New Mexico and U.S. residents remained relatively stable. In 2015–16, the prevalence among New Mexico residents was 19.2%; for U.S. residents, it was 18.1%" (New Mexico Department of Health, 2018, page 53; see Figure 6). During community focus groups held in August 2019, members shared concerns about the mental health (e.g., depression, anxiety) of their children due to bullying, the overpopulation of schools, being isolated, lack of access to quality education or health services, and other impacts.

SOUTH VALLEY: EDUCATIONAL ATTAINMENT

According to the 2013–2017 American Community Survey data estimates, approximately 74% of South Valley neighborhood residents had obtained a high school degree or higher, while only 13% had obtained a bachelor's degree or higher (U.S. Census Bureau, 2013–2017 American Community Survey 5-Year Estimates). Less educational attainment impacts the type of employment available to residents and the income level and benefits associated with their employment (Figure 7). There are a total of ten elementary schools, three middle schools, and one high school serving this neighborhood and that of the Westgate Heights/Vecinos neighborhoods.

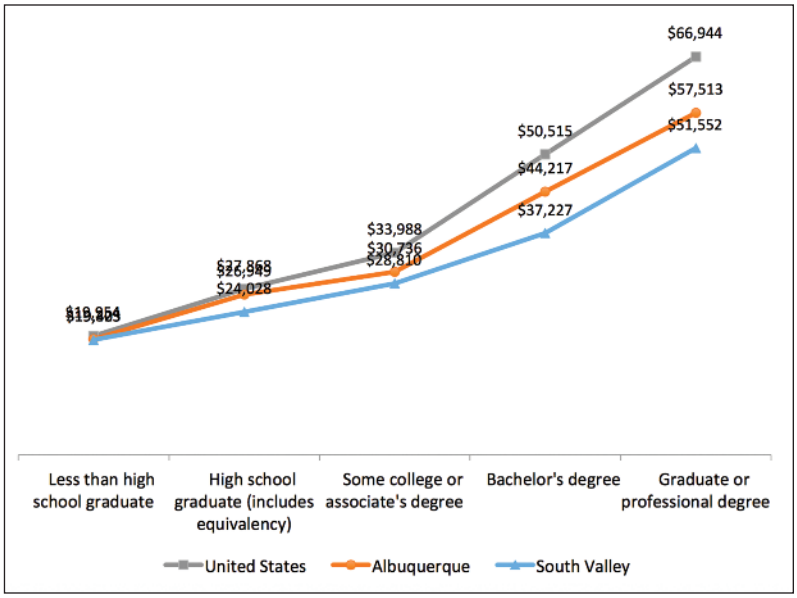


FIGURE 7: MEDIAN EARNINGS BY EDUCATIONAL ATTAINMENT
(SOURCE: UNIVERSITY OF NEW MEXICO NM EVALUATION LAB, 2016)

According to a 2011 policy brief by the Robert Wood Johnson Foundation, which explores the impact that educational attainment has on health,

People with more education are likely to live longer, to experience better health outcomes, and to practice health-promoting behaviors such as exercising regularly, refraining from smoking, and obtaining timely health care checkups and screenings. Educational attainment among adults is linked with children's health as well, beginning early in life: babies of more-educated mothers are less likely to die before their first birthdays, and children of more-educated parents experience better health (RWJF, 2011 p. 1).

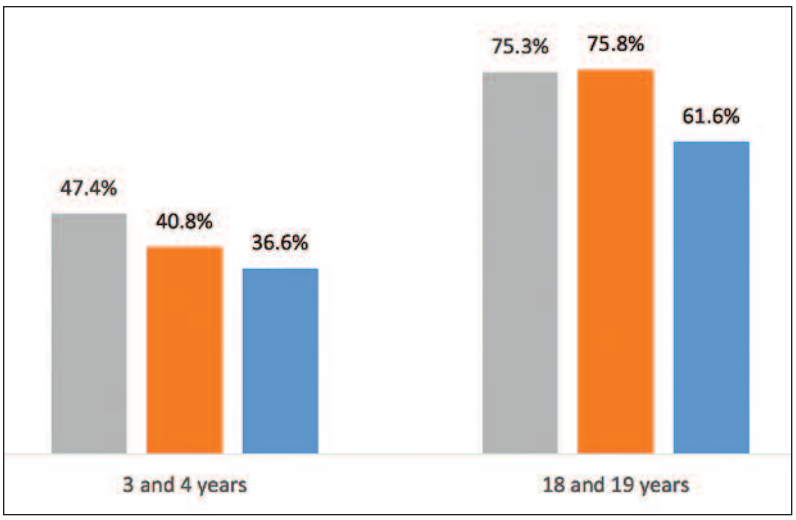


FIGURE 8: ENROLLMENT RATES FOR PRESCHOOLERS AND OLDER TEENS (SOURCE: IBID)

Thus, in a community like South Valley, already low rates of advanced degree attainment have real impacts on long-term health. Further, according to analysis conducted by the University of New Mexico's NM Evaluation Lab, "too few young children and older teens are in school" in South Valley, due to a number of factors, as compared to Albuquerque or the United States overall, pointing to an early start at diminished educational attainment (Figure 8). During the August 2019 community focus groups, a few parents mentioned that asthma was a cause for their child's absences from school. **Therefore, any additional impacts to student attendance in school, such as the exacerbation of childhood asthma from diesel exhaust from school buses, ultimately impacts educational attainment, which has cascading impacts on health.**

SOUTH VALLEY: INCOME AND JOB SECURITY

The median income for South Valley households is $38,447, lower than the national average of $60,336 (Viz Builder, 2019a). Comparing the median household income of the South Valley neighborhood to other parts of the city and state, South Valley falls far below other comparable regions (Figure 9). Approximately 18% of families (27% of the overall population) live below the poverty line, higher than the national average of 13%. Hispanics were the most common racial or ethnic group living below the poverty line (47% of Hispanics).

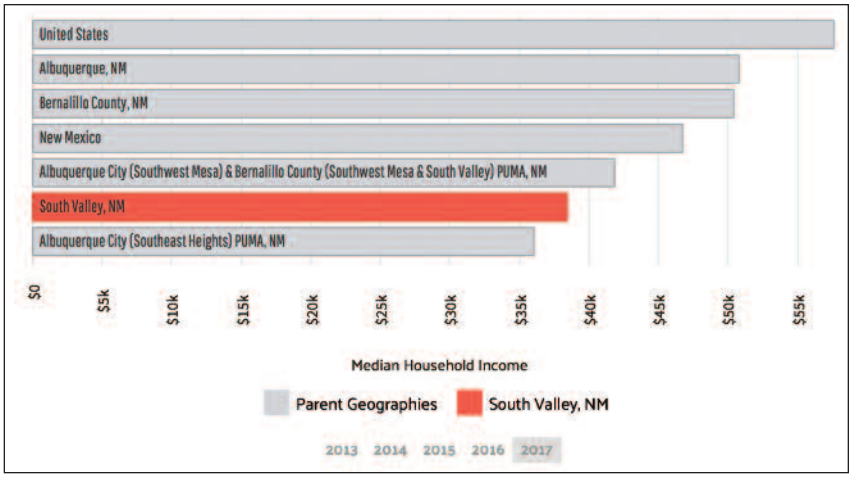


FIGURE 9: MEDIAN HOUSEHOLD INCOMES BASED ON DATA FROM 2017 FOR SOUTH VALLEY, NM AND COMPARISON REGIONS (SOURCE: VIZ BUILDER, 2019A)

The sectors employing the residents of South Valley trend toward lower paid work, such as office administration and support, construction, sales, management, and food preparation and serving (Figure 10). According to a 2012 report based on the Bureau of Labor Statistics' American's Time

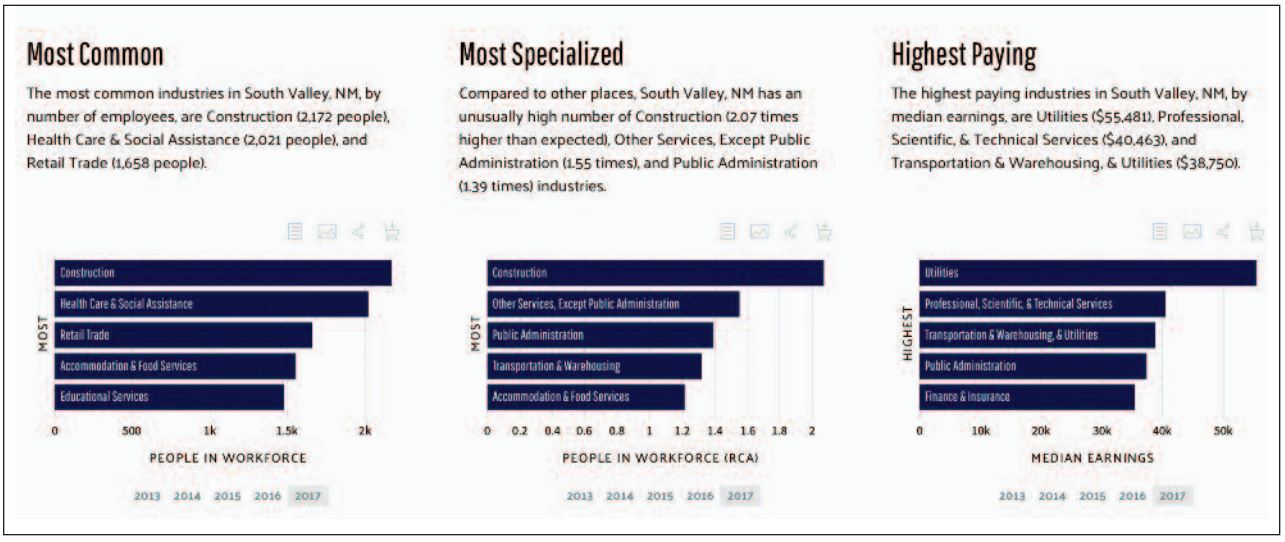


FIGURE 10: EMPLOYMENT TRENDS FOR SOUTH VALLEY, NM, 2017 (SOURCE: VIZ BUILDER, 2019A)

South Valley Neighborhood, Albuquerque

Use Survey, Latinos are least likely to have paid time off or workplace flexibility, something also characteristic of low-quality, low-wage jobs (Glynn and Farrell, 2012). Given the high percentage of Latinos (Hispanics) living in South Valley, this data is particularly relevant to this community. In cases where a child falls ill and must miss school, a parent often must choose between their job or the health and well-being of their child. Thus, in cases where children's health is worsened by exposures to diesel emissions from the school bus transporting them to school—often the only form of transportation available to them to obtain their education—this impacts the income and job security of parents who are already teetering on the edge financially, as they risk losing valuable income when they miss work to care for a sick child.

South Valley neighborhood residents discuss the impacts of diesel pollution on the community. (photo credit: M. Tyanne Benallie)

Westgate Neighborhood, Albuquerque

WESTGATE: DEMOGRAPHICS

For the purposes of this assessment, **the Westgate Neighborhood consists of both "Westgate Heights" and "Westgate Vecinos."** Data for both is provided below.

WESTGATE HEIGHTS: DEMOGRAPHICS

Map of Westgate Heights neighborhood

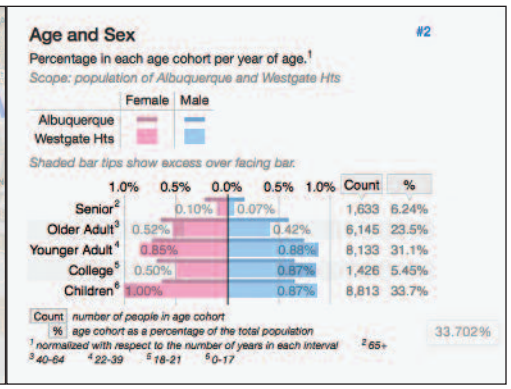


FIGURE 11: AGE AND SEX DISTRIBUTION FOR WESTGATE HEIGHTS (SOURCE: STATISTICAL ATLAS, 2019A)

Westgate Heights has a total population of 26,149 and 7,376 households (Statistical Atlas, 2019a). Hispanics make up 83% of the population, and school-aged children make up 34%, the largest age group in the population (Figure 11).

WESTGATE VECINOS: DEMOGRAPHICS

Map of Westgate Vecinos neighborhood

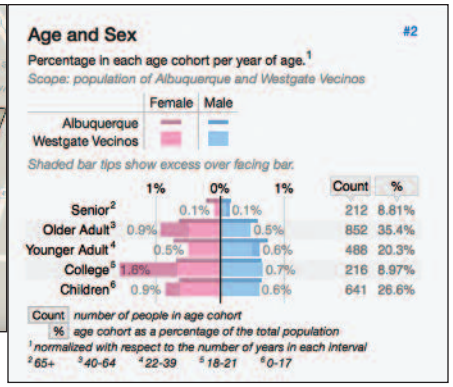


FIGURE 12: AGE AND SEX DISTRIBUTION FOR WESTGATE VECINOS (SOURCE: STATISTICAL ATLAS, 2019B)

Westgate Vecinos has a total population of 2,409 and 721 households (Statistical Atlas, 2019b). Hispanics make up 87% of the population, and school-aged children make up 27% of the population (Figure 12).

Westgate Neighborhood, Albuquerque

WESTGATE: AIR POLLUTION

Diesel Bus Air Pollution and Background Air Pollution

The closest monitor to the Westgate community is the South Valley air pollution monitor. Background information about diesel bus pollution and legacy/background air pollution summarized for South Valley (see South Valley: Air Pollution on page 17) is relevant for Westgate as well.

WESTGATE: PHYSICAL AND MENTAL HEALTH

The physical and mental health conditions facing the community of Westgate are equivalent to those facing the community of South Valley (see South Valley: Physical and Mental Health on page 19), as much of the data reported is county-level data. As already mentioned, asthma is one of the more common chronic diseases in the state, with an estimated 45,503 children having been "ever diagnosed" with the illness in New Mexico. (State of New Mexico Public Education Department, 2009). Further, **given the high percentage of Hispanics living in the Westgate community—over 80% of the population—there is a higher risk of asthma exacerbations at baseline than for other communities in the Albuquerque area with different demographics.** Hispanics are two times as likely to both visit an emergency room for asthma and die from asthma, as compared to non-Hispanic whites (U.S. Department of Health and Human Services, 2019). These baseline health conditions demonstrate a community that meets the definition of a **vulnerable population,** which is, "groups and communities at a higher risk for poor health because of the barriers they experience to social, economic, political, and environmental resources, as well as limitations due to illness or disability" (National Collaborating Centre for Determinants of Health, 2019). **Thus, the additional individual and neighborhood exposure of diesel emissions from school buses idling and transporting children to and from school is an additional impact on the physical and mental health of school-aged children and their families.**

WESTGATE: EDUCATIONAL ATTAINMENT

WESTGATE HEIGHTS

In Westgate Heights, most of the population over 25 years old has only a high school diploma (59%), and only 18% of the population has a higher degree. There are ten elementary schools, three middle schools, and one high school serving this neighborhood and South Valley.

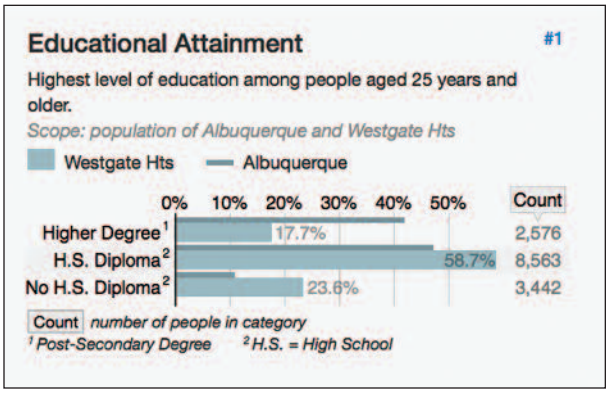


FIGURE 13: EDUCATIONAL ATTAINMENT FOR WESTGATE HEIGHTS (SOURCE: STATISTICAL ATLAS, 2019A)

WESTGATE VECINOS

In Westgate Vecinos, most of the population over 25 years old has only a high school diploma (52%), and only 12% of the population has a higher degree.

As has already been articulated, lower educational attainment is associated with poorer quality health and well-being (see South Valley: Educational Attainment on page 22). Regular school attendance is an important aspect of obtaining an education. Therefore, any deterrent to student attendance in school, such as childhood illness, ultimately impedes educational attainment.

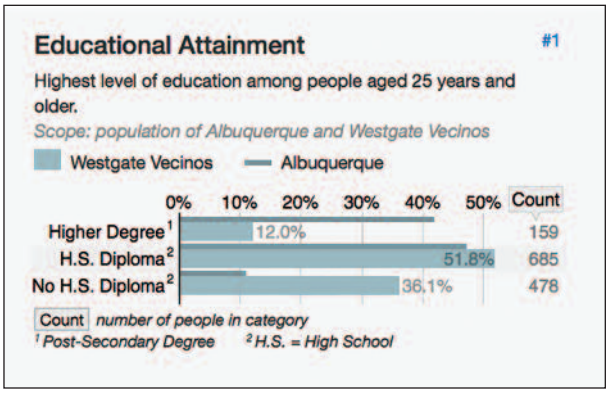


FIGURE 14: EDUCATIONAL ATTAINMENT FOR WESTGATE VECINOS (SOURCE: STATISTICAL ATLAS, 2019B)

WESTGATE: INCOME AND JOB SECURITY

WESTGATE HEIGHTS

The median income for the average Westgate Heights household is $44,600, lower than other neighborhoods in Albuquerque and the national average of $60,336, demonstrating that a large percentage of the community is either low-income or living in poverty (Statistical Atlas, 2019a, Figure 15).

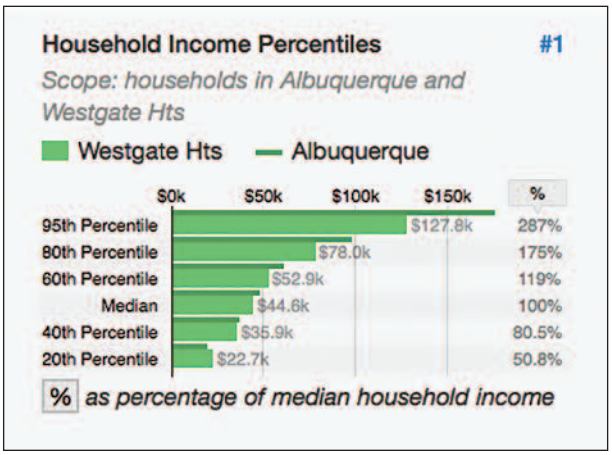


FIGURE 15: HOUSEHOLD INCOME - WESTGATE HEIGHTS VS. ALBUQUERQUE (SOURCE: STATISTICAL ATLAS, 2019A)

Occupations trend toward lower-wage, more blue-collar professions in the community (Figure 16). In most families (67%), both parents are employed, making the income and job security data more poignant—even with dual incomes, the Westgate Heights community has high poverty rates (Ibid.).

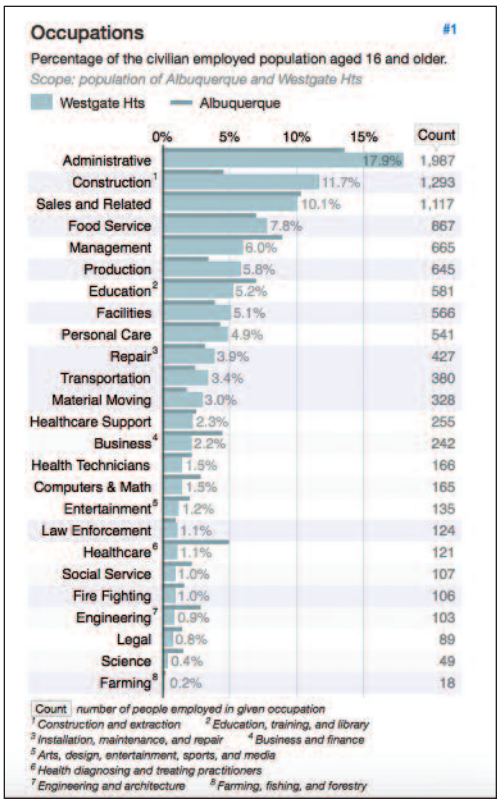


FIGURE 16: OCCUPATIONS – WESTGATE HEIGHTS VS. ALBUQUERQUE (SOURCE: STATISTICAL ATLAS, 2019A)

WESTGATE: INCOME AND JOB SECURITY

WESTGATE VECINOS

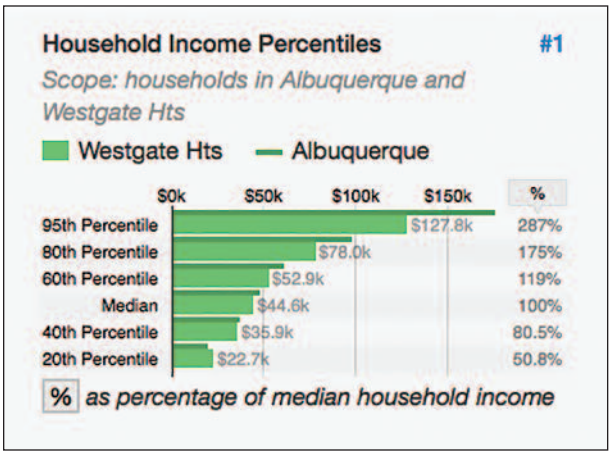


FIGURE 17: HOUSEHOLD INCOME – WESTGATE VECINOS VS. ALBUQUERQUE (SOURCE: STATISTICAL ATLAS, 2019B)

The median income for the average Westgate Vecinos household is $45,000, lower than other neighborhoods in Albuquerque and the national average of $60,336, demonstrating that a large percentage of the community is either low-income or living in poverty (Statistical Atlas, 2019a, Figure 17).

Like Westgate Heights, occupations trend toward lower-wage, more blue-collar professions in the community (Figure 18). In more than half of families (56%), both parents are employed. Again, even with two incomes, Westgate Vecinos has high poverty rates (Ibid.).

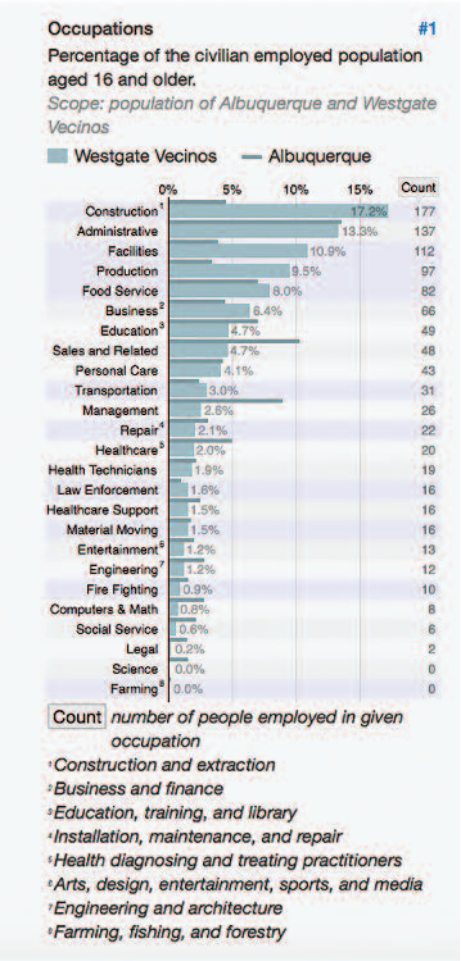
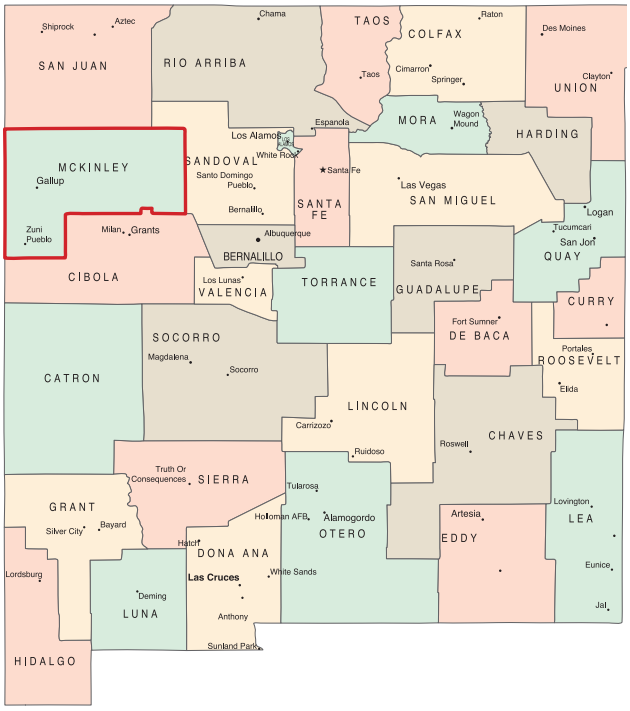


FIGURE 18: OCCUPATIONS FOR WESTGATE VECINOS VS ALBUQUERQUE (SOURCE: STATISTICAL ATLAS, 2019B)

As was mentioned previously, many community members who participated in the community focus group in August 2019 expressed concern about income and job security due to the fact that many of them work in sectors that do not provide paid time off and do not offer flexible schedules. For those who do have the ability to take time off work to care for a sick child, time off work is unpaid, further exacerbating their concerns about making ends meet. Thus, in cases where children's health is worsened by exposure to diesel emissions from their school bus—often the only form of transportation available to them to obtain their education—this impacts the income and job security of parents already teetering on the edge financially.

McKinley County, New Mexico



McKinley County has a population of approximately 72,849 residents, of which 11,631 are students enrolled in the 34 Gallup-McKinley County Schools (GMCS). McKinley County includes some of the Navajo Nation and the Zuni Pueblo (Viz Builder, 2019b). What follows are air pollution exposure, physical and mental health, educational attainment, and income and job security indicators for the neighborhood of Gallup selected for inclusion in this assessment. Where neighborhood-level data is unavailable, McKinley County data is used as a proxy.

FIGURE 19: BODY COLLAGE FOR MCKINLEY COUNTY FROM HIA KICKOFF, CONVENING FEBRUARY 2019

The gut represents your home and where you come from (your land). The right side represents family and elders who teach us the past so we know where to go in the future. The middle represents pollution (e.g. power plants) and the impact on the tribe. We breathe in bad stuff and it affects the heart, causes you to wither away, get sick and let the elements take over you. The left side represents ceremonies (e.g., dancing and singing for fun not for performance). We were told by holy people you do this to keep things in order. Without this, there will be chaos.

Gallup Neighborhood, McKinley County

GALLUP: DEMOGRAPHICS

The City of Gallup, located in McKinley County, had an estimated population of 21,929 as of the 2010 U.S. Census, with a median age of 31 years (U.S. Census, 2017a). Approximately 37% of the population are American Indian/Alaska Native, 35% are Hispanic, and 21% are white (Data USA, 2019a). Of the total 6,891 households, approximately 34% of this rural community have school-aged children living within the home (U.S. Census, 2017b). Approximately 50% of the adults speak Navajo at home (Ibid.).

The landscape near Gallup.

AIR POLLUTION

Diesel School Bus Pollution

School buses in McKinley County (photo credit: Rebecca Touchin)

Background information about diesel bus pollution has been summarized in earlier sections of this assessment (see **Diesel School Bus Pollution on page 17**). According to data provided by the McKinley County School District, children ride the bus, on average, over 60 miles per day round trip, with many traveling distances much longer—up to 268 miles round trip (see **APPENDIX III: McKinley County Schools' Bus Routes in Miles**). These long distances traveled on a school bus result in high and chronic levels of pollution exposure for children. During a community forum held in McKinley County in August 2019, residents described these long bus rides as being a necessity in order for their children to have access to public education. Further, during drop off and pick up, residents report seeing buses idle between 10 and 30 minutes in front of the school, where children are queuing to board or get off the school buses. These combined exposures represent high levels of diesel exhaust exposure for McKinley County children.

Background Pollution

Specific data for McKinley County for ozone or particulate matter exceedance is unavailable because local air quality monitors are not in place. The New Mexico Environment Department does not have jurisdiction to administer air quality standards over much of McKinley County, as it is mostly tribal land (email communication, Donna J. Intermont, New Mexico Environment Department, Operations Section Chief, September 6, 2019). While it is possible that the tribes are monitoring for air pollution, during the preparation of this assessment report we were unable to obtain any air pollution monitoring data. This is not to suggest that local sources of air pollutants, such as a major train line, busy roadways, freeways, or point-source pollution, are not a problem in either McKinley County or Gallup. During a series of community conversations held in August 2019, community residents expressed concern about the numerous sources of air pollution, including the train, which is known to idle and emit diesel exhaust throughout the community. The region has been taxed with other environmental pollutants over the course of the past many

decades, including the Church rock uranium mining site as a legacy pollutant that the community is still struggling to manage. In addition, an estimated 120 abandoned uranium mines still exist in McKinley County alone (Johnson et al., 2015). A full list—a staggering number—of the mines, oil, and gas operations in the county can be found in **APPENDIX V: Mines, Oil & Gas industries in McKinley County, NM. The combination of diesel school bus emissions with other pollution sources and legacy pollutants puts school-aged children and their families at heightened exposures to air pollution, which result in negative impacts to their health and well-being.**

Red Rock Regional Landfill in McKinely County (photo credit: Rebecca Touchin)

GALLUP: PHYSICAL AND MENTAL HEALTH

Overall Health

The general health status of the community of McKinley County needs improvements (Figure 20). Just over half (55%) of the McKinley County community has access to a primary medical provider, which may result in people not obtaining the medical care they need and experiencing unnecessary complications from existing health conditions (New Mexico Indicator-Based Information System, 2019a). Chronic disease rates in McKinley County—for example, rates of diabetes deaths per 100,000 people—demonstrate strong reason for concern. McKinley County's number of deaths from diabetes per 100,000 is almost 68, or significantly higher than that of New Mexico (26) and the United States as a whole (21). The negative effects of diabetes include not only the medical costs and the loss of life, but also a diminished quality of life (mental health impacts) and decreased productivity (loss of income and job security) for caregivers.

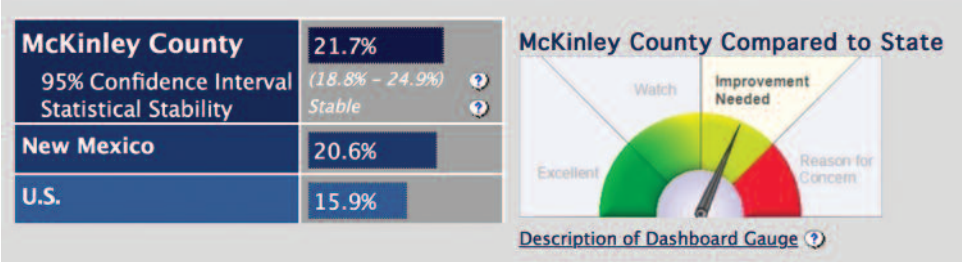


FIGURE 20: GENERAL HEALTH STATUS – PERCENTAGE IN FAIR/POOR HEALTH, 2015-2017 (SOURCE: NM-IBS, 2019A)

Asthma

Childhood asthma rates are a clear contributor to adult mental distress for their parents. McKinley County has some of the highest childhood asthma emergency department (ED) visit rates in the state, with 118.2 per 10,000 people seeking asthma care in an ED, as compared to the state rate of just over 63 per 10,000 (Figure 21). During a community forum held in August 2019 with residents of Gallup, many parents reported that their children suffered from asthma, as well as mental and behavioral health issues (e.g., anxiety, depression). Many parents expressed concerns about the lack of services and care provided on-site at schools for these physical and mental health

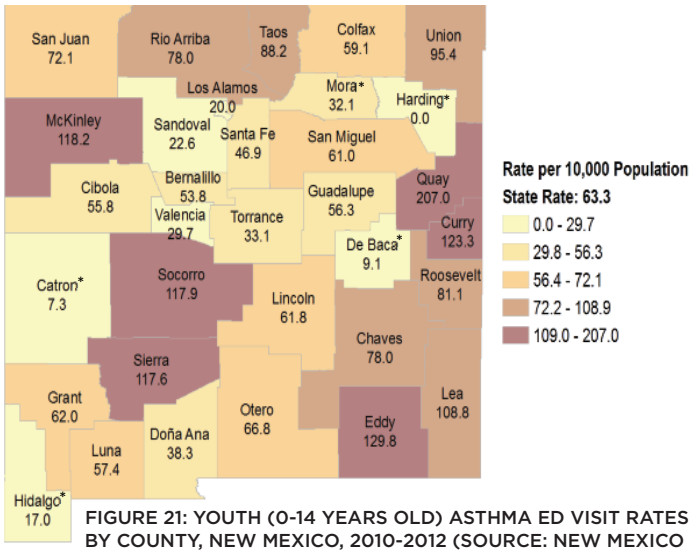


FIGURE 21: YOUTH (0-14 YEARS OLD) ASTHMA ED VISIT RATES BY COUNTY, NEW MEXICO, 2010-2012 (SOURCE: NEW MEXICO DEPARTMENT OF HEALTH ED DATA, 2010-12)

challenges. Parents also reported that they often kept their children home from school when their asthma was exacerbated as, according to one parent, "I felt safer with him at home when he is wheezing." Another parent reported that, "because of [my child's] asthma conditions, he is on medications, after which he sometimes shows lack of sleep or eating."

Mental Health

McKinley County data indicates that adult mental health in the county is stable and similar to that of the state overall (Figure 22). Self-reported "Adult Mental Distress" for McKinley County, including "stress, anxiety, mental health challenges arising from chronic physical conditions such as diabetes, asthma, and obesity" shows that one in five adults are struggling with one or more of these conditions (NM-IBS, 2019b). Thus, the additional individual and neighborhood exposure to diesel emissions from school buses idling and transporting children to and from school is an additional impairment to the physical and mental health of school-aged children and their families.

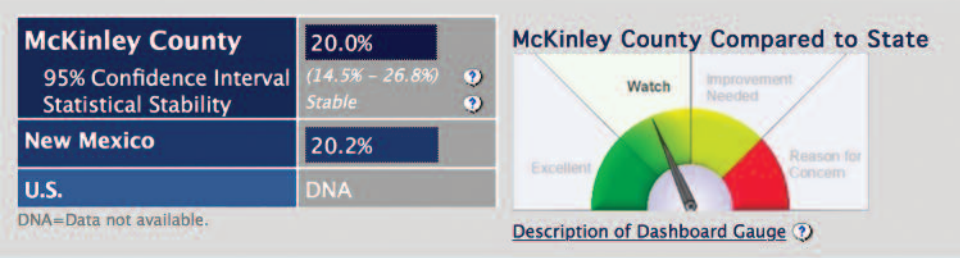


FIGURE 22: MCKINLEY COUNTY ADULT PERCENTAGE WITH MENTAL DISTRESS, 2017 (SOURCE: NM-IBS, 2019B)

GALLUP: EDUCATIONAL ATTAINMENT

Sign for Gallup McKinley County School District

According to the 2010 U.S. Census, approximately 80% of the population in Gallup has a high school education or above, but only 20% has achieved a bachelor's degree or higher (U.S. Census, 2017b). As summarized in other sections of this report (see **South Valley: Educational Attainment on page 22**), lack of higher education often determines the type of employment available to residents, the salary and benefits associated with their employment, and their overall life-span.

The demographics of the student population in Gallup show that 28% of the student body are English language learners, 5% of students are homeless, and 100% are eligible to receive free lunch due to income eligibility (U.S. Census, 2017b). Moreover, the Gallup McKinley County School District is geographically the largest school district in New Mexico, covering 4,857 square miles (Figure 23), which means many students are required to travel long distances in order to attend school. All of these factors combined result in a student body that is overly stressed by socioeconomic factors. Further, many parents reported during a community forum that their children were missing school due to asthma. Parents expressed concern that the lack of asthma care within the schools is a key factor in keeping their child home from school, where they can be safe. As one mother reported, "My son has gotten off the school bus barely able to breathe because he is too afraid to speak up about what's wrong." Another parent reported having a child with asthma who recently "had to miss one week of school," and the parent had to take a week off from work to care for their child. These missed school days hinder a child's ability to keep up with the schoolwork being presented in the classroom.


Dirt road infrastructure on Navajo Nation (photo credit: Rebecca Touchin)

Gallup Neighborhood, McKinley County

McKinley County has twelve elementary schools serving over 3,500 children, six middle schools serving almost 1,500 children, and ten high schools serving over 3,600 children. These schools have incredibly rich racial and ethnic diversity, with the largest percentage of students being Native Americans, followed by Hispanics (see **APPENDIX IV: McKinley County Schools' Demographics**). While the McKinley School District administrators did not have data about asthma and attendance rates, they provided data showing that many children travel long distances to and from school on school buses, with some routes showing round-trip distances of up to 268 miles per day, while the average was around 60 miles per day (see **APPENDIX III: McKinley County Schools' Bus Routes in Miles**)

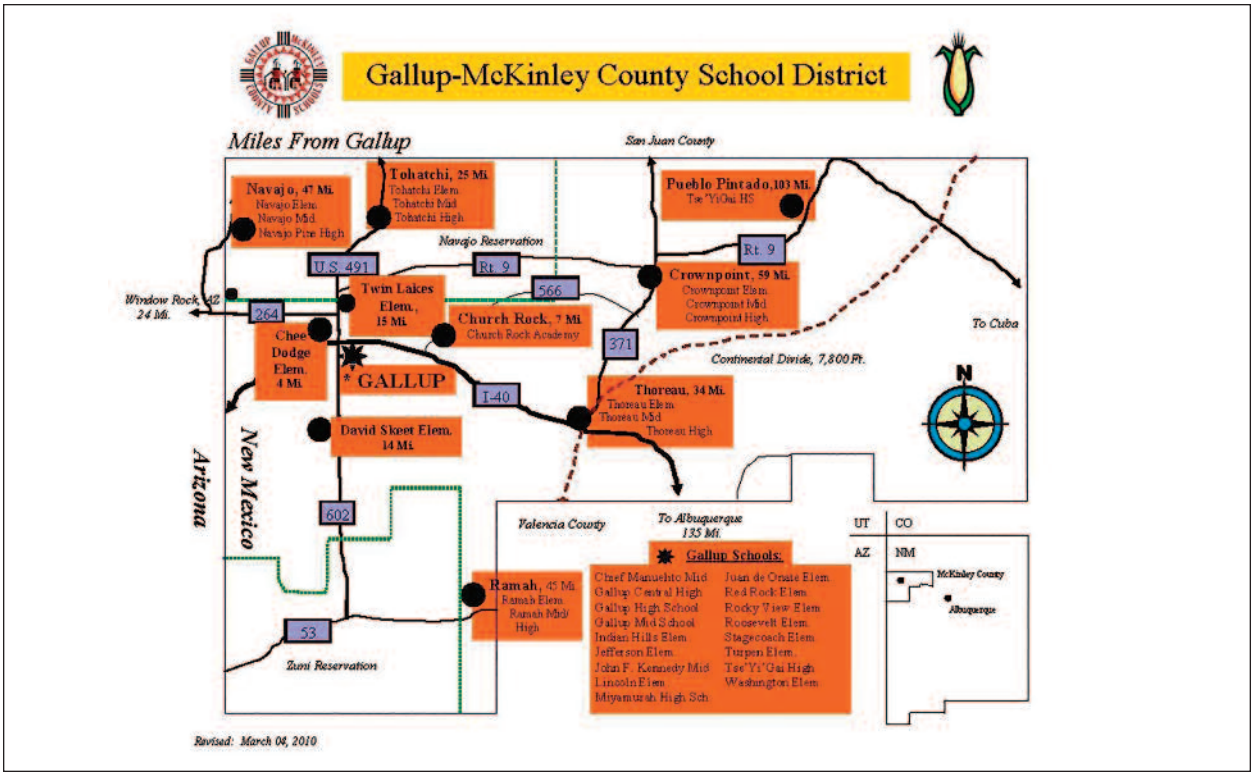


FIGURE 23: MCKINLEY COUNTY SCHOOL DISTRICT BOUNDARIES

GALLUP: INCOME AND JOB SECURITY

The median household income in Gallup is $43,598, lower than the national average of $60,336 (U.S. Census, 2017b). Approximately 30% of the residents in the community live below the poverty line, higher than the national average of 13%. Native Americans are the most common racial/ethnic group living below the poverty line in the community of Gallup (Figure 24). Community-level data is unavailable for childhood poverty, but McKinley County data for children aged 0–18 years demonstrates a reason for concern, as almost half (46%) of children live in poverty (Figure 25).

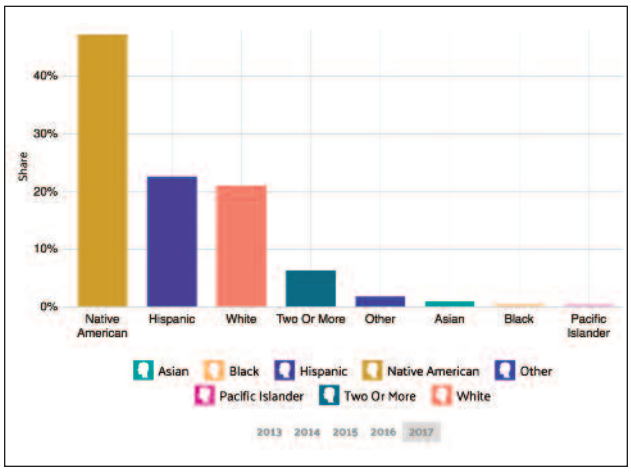


FIGURE 24: BREAKDOWN OF PERSONS LIVING BELOW THE POVERTY LINE BY RACE/ETHNICITY (SOURCE: USA DATA 2019A)

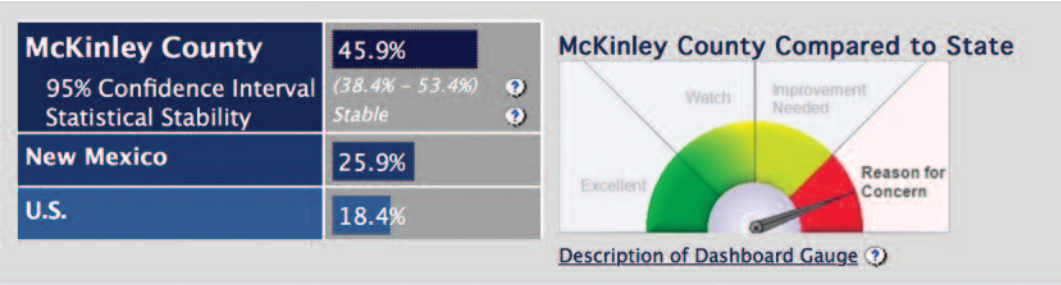
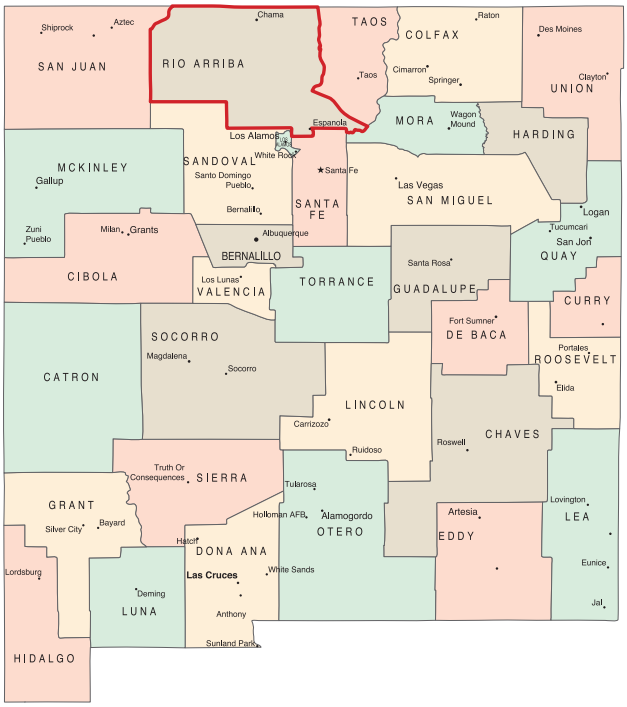


FIGURE 25: POVERTY AMONG CHILDREN UNDER AGE 18 – PERCENTAGE OF CHILDREN AGE 0-17 IN POVERTY, 2017 (SOURCE: NM-IBS, 2019A)

Parents in an August 2019 community forum described how having asthmatic children adversely impacted their income and job security. **"My husband's job will only allow him to request leave if we have a medical statement. I have had to quit jobs to care for my children,"** one mother explained. Further, parents who worked did so under conditions that largely did not provide flexible time off, so parents expressed worry about making ends meet. **"We currently are having to go without, and the kids feel the impact [because of having to miss work and pay for child-care or medical expenses]." Thus, in cases where children's health is worsened by exposure to diesel emissions from their own school bus, this adversely impacts the income and job security of parents already teetering on the edge financially.**

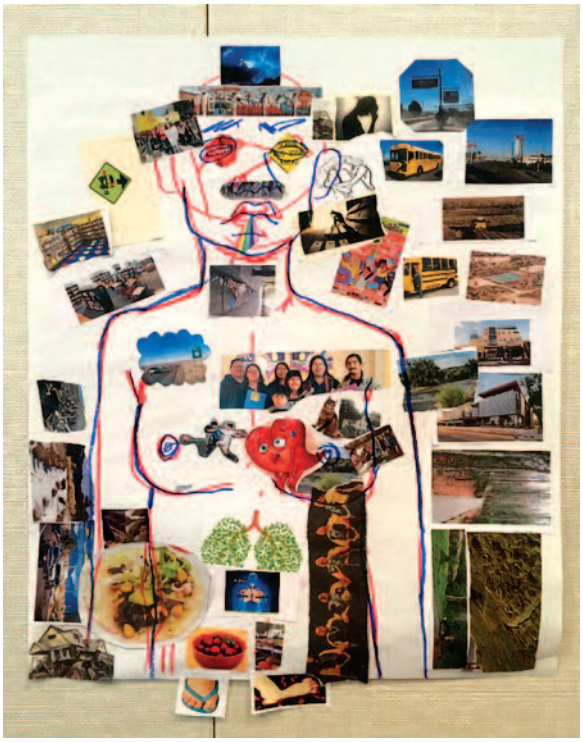
Rio Arriba County, New Mexico



Rio Arriba County has a population of 39,006 and is the fifth largest county in the state of New Mexico. Over 70% of the population is Hispanic or Latino (U.S. Census, 2010) and 20% is American Indian/Alaskan Native—the region is rich in cultural diversity. What follows are air pollution exposure, physical and mental health, educational attainment, and income and job security indicators for the City of Española selected for inclusion in this assessment. Where neighborhood-level data is unavailable, Rio Arriba County data is used as a proxy.

Sunset sky near a main road in Rio Arriba County (photo credit: M. Tyanne Benallie)

The palms of this man's hands wield school buses and children—transition to electric from diesel is easy because it is in the palm of their hands. The images on the arms represent water and farming. Within his heart, you can see the river and the dog as animals are in his heart. Around the body are things that are bad—asthma, smoking, liquor. The chest area has music as we all need music in our chest. There are rivers and acequias that represent clean water. On his head is depression and educatiom. Around him you see local places—mountains, libraries, art and murals. We hope that our communities will stay looking like the mountains here and engage more in farming and with people and ourselves.



This body collage represents community, water, land and food that help support our system. The lungs are affected by asthma and the bad effects of things that go into the air that affect our health. The factors include air pollution, oil, gas, deforestation of our trees.

FIGURE 26: BODY COLLAGES FOR RIO ARRIBA COUNTY FROM HIA KICKOFF, CONVENING FEBRUARY 2019

Española Neighborhood, Rio Arriba County

ESPAÑOLA: DEMOGRAPHICS

Española is located in the southwest portion of Rio Arriba County, with a population of 10,050 and a median age of 37 (U.S. Census, 2010b). Over 86% of the population is Hispanic/Latino, and of the 3,646 households in the county, over 27% of them have school-aged children living in the home (Ibid.). Almost 64% of the people living in Española speak a non-English language (Data USA, 2019b).

ESPAÑOLA: AIR POLLUTION

Diesel School Bus Pollution

Background about diesel bus pollution has been summarized in earlier sections of this assessment (see **Diesel School Bus Pollution on page 17**). As previously discussed, pollution from school buses is not limited to exposure while riding the bus; school buses also idle in front of schools before school starts and after school ends, during drop-off and pickup. This pollution exposes the entire school population and even the surrounding community—residents in an August 2019 community forum reported that buses are known to idle for as long as 20 minutes per day before and after school.

Background Pollution

Since February 2013, Rio Arriba County has an air monitor in place at the "Coyote" site,[2] which was put into place in February 2013. The monitor does not include data for particulate matter, but it has been monitoring ozone. From 2013 to 2018, exceedances (of 0.070 ppm) for ozone have been recorded at the monitoring site at various hourly points. These exceedances result from local sources, such as busy roadways, freeways, or other singular, or point-source pollution sources in either Rio Arriba County or the community of Española. As evidence of a need to respond to legacy pollution, the City of Española received $149,300 in grant funds between 2012 and 2016 from the Environmental Protection Agency (EPA) under its EPA Performance Partnership Grants. These funds allow the city to work toward its "most pressing air, water and land issues" (Environmental Defense Fund, 2017, p. 2). The Trump Administration has proposed a massive 44 percent reduction in these grant funds, which means the city could lose future funding to work on these important issues, further contributing to impacts from legacy pollution (Ibid.). Further, the largest employer for the city of Española, the Los Alamos National Laboratory, is a legacy polluter, as high levels of radioactive and toxic chemicals (e.g., plutonium and trichloroethylene) have been found to be present, potentially affecting the water and soil in the surrounding communities (Centers for Disease Control and Prevention, 2019). These chemicals

can build up in groundwater and soil and cause health impacts, including lung and kidney cancers. **The combination of diesel school bus emissions with legacy pollutants puts school-aged children and their families at heightened exposures to air pollution, which could result in impacts to their health and well-being.**

FIGURE 27: ESPANOLA TRANSIT MIX SAND AND GRAVEL FACTORY (PHOTO CREDIT: M. TYANNE BENALLIE)

2 Air monitoring data can be tracked here: http://nmaqinow.net/.

ESPAÑOLA : PHYSICAL AND MENTAL HEALTH

Overall Health

Rio Arriba County data indicates that there is "reason for concern" regarding the general health status of the community (Figure 28). For example, life expectancy within Rio Arriba County (74 years) is much lower than that of the state of New Mexico overall (78.3 years) and the United States overall (78.6 years) (NM-IBS, 2019F). Just over 17% of the population lacks medical insurance, and 25% lack access to a primary care provider—two critical indicators for access to medical care (Ibid.).

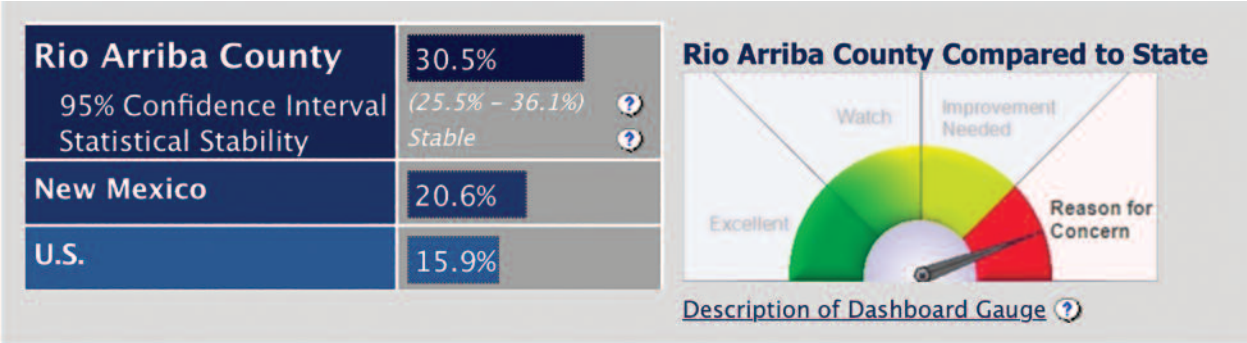


FIGURE 28: GENERAL HEALTH STATUS – PERCENTAGE IN FAIR/POOR HEALTH, 2015-2017

Asthma

County-level childhood (0–17 years old) asthma hospitalization rates per 10,000 people are 15.8, as compared to 14.4 in New Mexico overall—an indicator for which the County acknowledges "improvement [is] needed" (Ibid.). As previously mentioned, asthma is one of the more common chronic diseases in the state, with an estimated 45,503 children having been "ever diagnosed" with the illness in New Mexico (State of New Mexico Public Education Department, 2009). **Further, given the high percentage of Hispanics living in Española—over 85% of the population—this creates a higher risk of asthma exacerbations at baseline than for other communities in New Mexico with different demographics.** Hispanics are twice as likely to both visit an emergency department for asthma and die from asthma, as compared to non-Hispanic whites (U.S. Department of Health and Human Services, 2019). This data indicates that Española is a community with troubling baseline physical and mental health conditions, the background of which has been more deeply discussed in earlier sections of this assessment (see **South Valley: Physical and Mental Health on page 19**). Based on data provided by the Rio Arriba School District, asthma is the second highest diagnosis among the student population after allergic disorders. A community with these baseline health conditions is one that meets the definition of a

vulnerable population, which is, "groups and communities at a higher risk for poor health because of the barriers they experience to social, economic, political and environmental resources, as well as limitations due to illness or disability" (National Collaborating Centre for Determinants of Health, 2019).

Mental Health

Rio Arriba County data indicates that adult mental health in the county is stable and equivalent to that in the state overall (Figure 29). The additional individual and neighborhood exposure of diesel emissions from school buses idling and transporting children to and from school could have an additional adverse impact to the physical and/or mental health of school-aged children and their families.

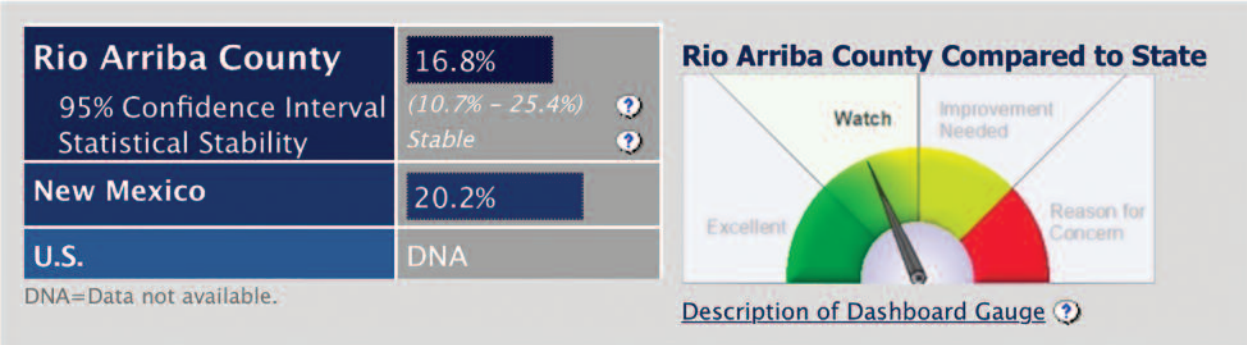


FIGURE 29: RIO ARRIBA COUNTY ADULT PERCENTAGE WITH MENTAL DISTRESS, 2017

ESPAÑOLA : EDUCATIONAL ATTAINMENT

According to the U.S. Census, 80% of Española residents have completed their high school education, while only 16% have a bachelor's degree or more (U.S. Census, 2010b). For Rio Arriba County, rates are only slightly higher, with 18.5% of residents having received a bachelor's degree or higher (Figure 30), causing a "reason for concern." According to the New Mexico Indicator-Based System Highlight Report for Rio Arriba County,

> Higher adult education levels are associated with greater earning potential, higher life expectancy, and increased social involvement. There is a relationship between more education and better mental well-being and overall health. People having higher education benefits society through: civic engagement, interest in societal issues, and stronger interpersonal connections.

FIGURE 30: EDUCATION, BACHELOR'S DEGREE OR HIGHER – PERCENTAGE OF ADULTS AGE 25+ WITH BACHELOR'S DEGREE OR HIGHER, 2013-2017 (SOURCE: NM-IBS, 2019E)

Achieving higher education is an important stepping stone to increased income, job security, physical health, and mental health, and laying a strong foundation for education starts at the beginning of a young person's educational career. As summarized in other sections of this report (see **South Valley: Educational Attainment on page 22**), lack of higher education impacts the type of employment available to residents, the income level and benefits associated with their employment, and their overall life span.

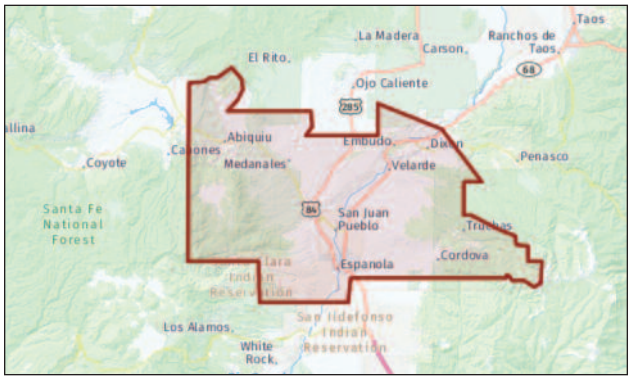


FIGURE 31: ESPANOLA PUBLIC SCHOOLS – DISTRICT BOUNDARY MAP. (SOURCE: NEW MEXICO HOME TOWN LOCATOR, 2019)

There are 10 Española public schools (elementary through high school) attended by a

total of 3,692 students (Española Public Schools, 2019). These schools span a large geographic area (Figure 31), requiring many students to be transported across the city to obtain their education. Therefore, any deterrent to student attendance in school, such as exacerbation of childhood asthma from diesel exhaust from school buses, ultimately impedes educational attainment.

ESPAÑOLA : INCOME AND JOB SECURITY

The median household income in Española is $27,350, just under half of the national average of $60,336 (Data USA, 2019b). **Almost 35% of the residents of Española, most of whom are Hispanic, live in poverty, as compared to the national average of just over 13%** (Data USA, 2019b). During a community forum in August 2019, many community residents stated that they have jobs for which they are paid hourly (e.g., cleaning houses), and although they have the flexibility to stay home with a sick child, they receive no payment for any days or hours missed from work. **Thus, the adverse effects on children's health caused by exposures to diesel emissions from the buses they ride to school may consequently reduce the income and job security of their parents, who may already be teetering on the edge financially.**

FIGURE 32: COMMUNITY MEMBERS SHARE CONCERNS DURING A COMMUNITY FORUM, AUGUST 2019

IV. IMPACT OF ELECTRIC SCHOOL BUSES ON PHYSICAL AND MENTAL HEALTH

My child gets angry because I can't help him. It is hard being positive about certain situations you encounter because you are trying to help your child.

—Comments from residents at community forum, August 2019

The baseline health data for families living in the target communities—South Valley, Westgate, Española, and Gallup—show vulnerable populations, susceptible to the debilitating consequences of environmental pollution, compromised public health, poverty, and low educational attainment, as described in each of the **Community Profiles.** The additional negative impacts of diesel exhaust from school buses, both while children ride the bus to and from school and while school buses idle in front of schools, will have cascading health effects on school-aged children and their families.

PHYSICAL HEALTH

A large body of research has documented the impacts that diesel exhaust—a complex mix of gases and fine particles identified by their size (e.g., PM10, PM2.5, PM0.1)—has on health (U.S. EPA, 2019). Namely, research has found that diesel exhaust may increase the frequency and severity of asthma attacks and increase inflammation of the airways, which can cause or worsen asthma following short-term, or acute, exposures (Miyamoto, 1997). Long-term exposure to diesel exhaust has been linked to an increased risk of lung cancer (U.S. Environmental Protection Agency, 2002). While many of the target communities do not have documented high ambient levels of PM, the known local, acute exposures from diesel school buses are significant enough to cause serious negative effects. School districts across New Mexico (and throughout the United States) are transporting the most vulnerable members of the community—young children—under circumstances that expose them to high levels of pollutants, in many cases for hours each day. **The very act of transporting children to and from school increases their risk of developing asthma and exacerbates symptoms for existing asthma sufferers. Students with asthma must address their medical needs, which impedes their ability to attend school regularly and diminishes their educational attainment.**

According to a 2001 report, which examined the impact of school bus exhaust on children's health, "Children are among those most susceptible to the health effects of diesel exhaust exposure because of the child's developing body and lungs, narrower airways, faster metabolism, and faster breathing rate than adults" (Solomon et al., 2001). Each of the communities are already burdened at baseline by high asthma hospitalization rates (an indicator of poorly controlled asthma), so exposure to diesel exhaust from school buses represents an additional burden on these communities' health. The University of Southern California's Children's Health Study is one of the longest longitudinal studies on the effects of air pollution on the lung health of children. Among many of its results, the study found that children exposed to high levels of air pollution have decreased overall lung function, suffer lung damage, and develop bronchitis symptoms. Exposure to diesel bus exhaust has the potential to bring about these effects, as well as trigger existing asthma among the students riding buses daily.

Asthma impacts students' educational attainment, but educational attainment also impacts health in a myriad of ways, including "health knowledge and behaviors; employment and income; and social and psychological factors, including sense of control, social standing and social networks" (RWJF, 2011, p. 1, and Figure 33). These health impacts result in a lowering of life span such that **those having finished college have a life span approximately five years longer than those who have not completed high school** (Ibid.). With findings this significant, ensuring that all barriers to children to attaining their highest educational goals be removed is literally a matter of life and death, and when any barriers persist, it is crucial that additional programming (e.g., tutoring, after-school education, etc.) be provided to support children's education.

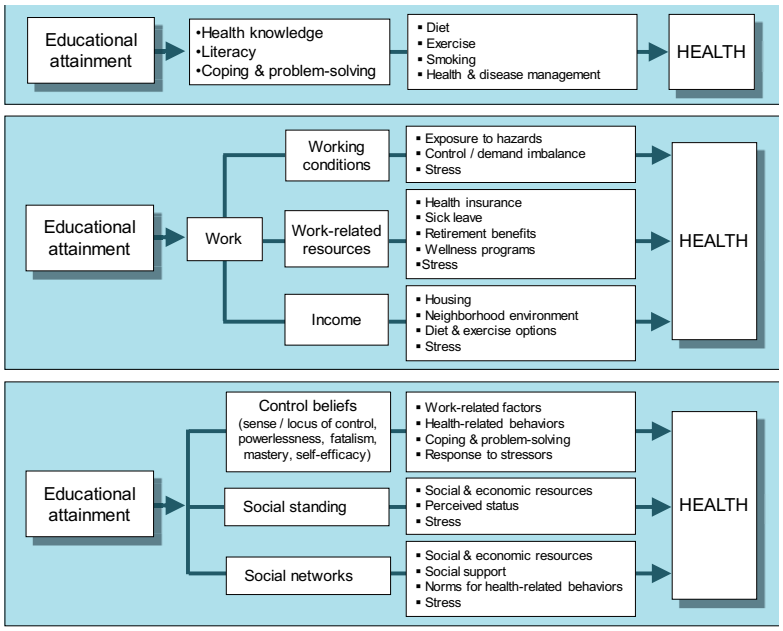


FIGURE 33: EDUCATION COULD AFFECT HEALTH THROUGH MANY DIFFERENT PATHWAYS (SOURCE: RWJF, 2017)

MENTAL HEALTH

According to reporting from the New Mexico Indicator-Based System, **"People with asthma are more likely to miss school or work, report feelings of depression, and experience an overall reduced quality of life."** Asthma is also costly, with expenses from routine checkups, emergency department visits, hospitalizations, and medications **putting a significant burden on families**, the health care sector, and the economy" (NM IBS, 2018). Loss of workdays **(income and job security)** and poor mental health **(physical and mental health)** increases the burden on parents and children with respiratory health issues. According to a 2009 study, The Impact of Childhood Activity Limitations on Parental Health, Mental Health, and Workdays Lost in the United States:

> **Parents of children with any activity limitations were significantly more likely to experience subsequent poor health and mental health.** Parents of children with ongoing or newly reported limitations had an increased number of lost workdays as compared with parents of children without limitations. **Moreover, caring for multiple children with activity limitations was predictive of adverse parental mental health outcomes.** Parents of children with ongoing activity limitations had significantly increased odds of poor mental health compared with parents of children with resolved limitations (Witt, Gottlieb, Hampton, & Litzelman, 2009, p. 5).

These communities struggle with a myriad of impacts from high poverty rates, chronic diseases, and mental illness or stress resulting from high rates of childhood asthma, impacting parents' ability to go to work and make enough money to support their families (see Community Profiles). Collectively, these impacts result in an environment of stress and overload for parents, who struggle to make ends meet while managing their children's health care needs.

In a series of community forums held in each community in August 2019, common themes emerged about the impacts of physical and mental health. Parents reported that they feel the schools are not taking care of their children or taking preventative measures to protect children's health. Parents also reported that there are not enough certified nurses within the school system. Instead, the schools often employ health aides who, according to parents, do not provide adequate support. Parents expressed concerns that there are high levels of depression and anxiety among their children. Further, Rio Arriba County participants stated that while they have school-based health centers, only high school students can use the facility. Parents expressed a desire for elementary and middle school students to have access to school-based health centers as well.

PHYSICAL AND MENTAL HEALTH
RECOMMENDATIONS

1. **School districts should enforce bus idling restrictions to ensure that students at the schools and those in the surrounding communities do not experience unnecessary exposure to air pollution from diesel school buses.**

2. **School districts should work to replace diesel-powered school buses with electric-powered (zero-emission) school buses, prioritizing communities where there are a large percentage of low-income, Latino/Hispanic, or Indigenous populations, in particular those whose students are burdened by long bus rides from rural communities. School districts should**

    a. **use their annual budgets to replace diesel school buses with electric school buses;**
    b. **use their budgets to purchase and install electric infrastructure, such as solar panels, storage batteries, and charging stations, to accommodate electric school buses;**
    c. **apply for funding from the Volkswagen settlement to replace diesel school buses with electric school buses; and**
    d. **monitor other funding sources, including the U.S. EPA's Clean School Bus USA funding, to continue working toward the full replacement of diesel buses with electric school buses.**

3. **School officials should work with their school bus contractors to initiate mitigation efforts immediately with the aim of decreasing exposure while the transition from diesel to electric is underway. These efforts can include installing filters on diesel buses to minimize diesel exposure for riders of diesel buses and ensuring that bus drivers seat students at the front of the bus first (where diesel levels are lower).**

4. **The New Mexico Environment Department, in administering the funds under the Volkswagen settlement, should encourage the replacement of diesel school buses with electric school buses.**

5. **The New Mexico Environment Department should work with the Navajo Nation to obtain and make publicly available any air quality monitoring data generated in Navajo lands.**

V. IMPACT OF ELECTRIC SCHOOL BUSES ON EDUCATIONAL ATTAINMENT

My son is 7 years old and when he comes home he is struggling to breathe because he takes his inhaler himself. He's only 7, he doesn't know how. They call me all the time and he is missing a lot of school [due to his asthma].

—Comments from residents at community forum, August 2019

Educational attainment is defined by the number of overall years of school an individual has completed (RWJF, 2011). While some absences from school may be unavoidable, some are certainly preventable. According to the State of New Mexico Public Education Department, "Asthma is the leading cause of missed school days due to chronic illness. This can potentially affect school performance, limit physical activity, and lead to poor self-concept. Further, there are increased doctor and hospital visits, additional medical costs, missed workdays for parents, and a general disruption in family routines" (State of New Mexico Public Education Department, 2009). Asthma requires coordinated care where children live, play, and learn. Children of low socioeconomic status—disproportionately children of color—have higher rates of and more severe asthma. The reasons range from higher exposure to indoor and outdoor pollutants, lack of access to health care or health insurance, other factors such as increased rates of obesity, and other in utero exposures (Carroll, 2013). Collectively, these impacts influencing the severity of a child's asthma result in less well-controlled asthma, more hospitalizations, increased ED visits, and longer illness, all of which hinder the child's ability to be present at school, learning.

Diesel exhaust from school buses, which transport children to and from school daily, is a trigger for asthma. Children are exposed to diesel exhaust both while the buses queue and idle in front of the schools during pickup and drop-off and, more significantly, while children are riding inside the school buses. According to a landmark and still-relevant report from 2001, No Breathing in the Aisles: Diesel Exhaust Inside School Buses, "A child riding inside of a diesel school bus may be exposed to as much as 4 times the level of toxic diesel exhaust as someone riding in a car ahead of it" (Solomon et al., 2001). Further, the report noted variability in the exposures that children experience depending on the age of the bus, whether the windows are up or down, where on the bus children are seated (the back of the bus has higher emissions than the front of the bus), and bus operating conditions (e.g., idling, accelerating, decelerating, coasting, or

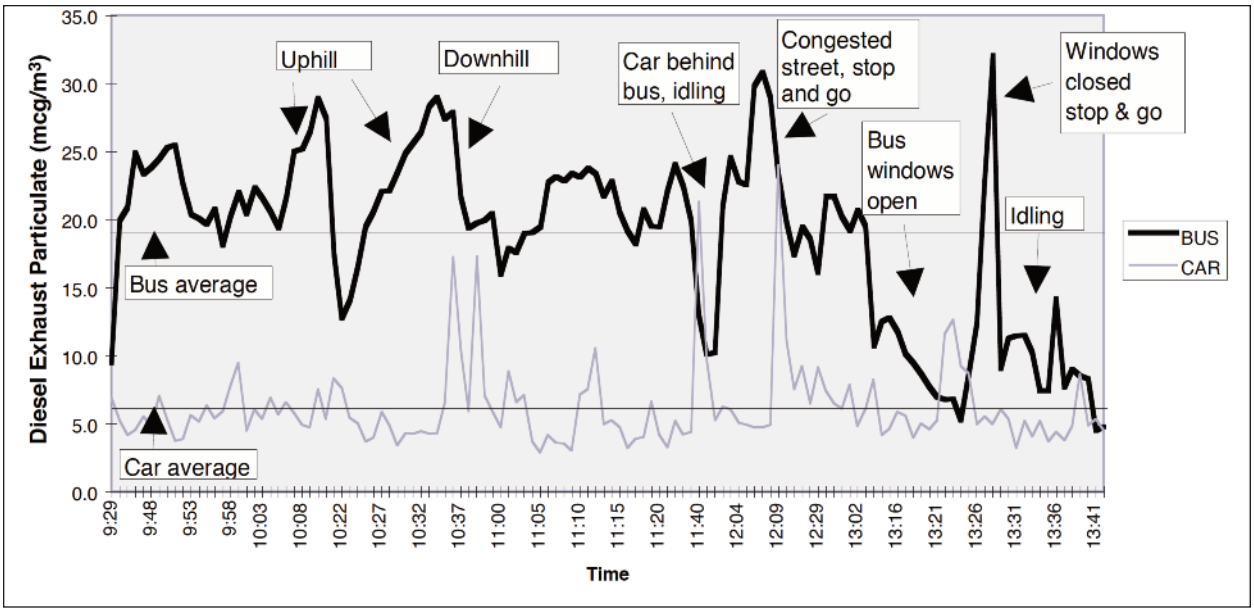


FIGURE 34: REAL-TIME BUS AND CAR COMPARISONS (SOURCE: SOLOMON ET AL., 2001)

climbing a grade). Results from the study found that when comparing real-time bus and car diesel exhaust particulate levels, buses had much higher rates than did cars in almost all cases (Figure 34).

Findings from a national longitudinal mortality study show that those who finish college have a life span approximately five years longer than those who have not completed high school, and these differences in life expectancy between college graduates and those with less than a high school diploma occur regardless of gender (RWJF, 2011, Figure 35). High levels of educational attainment are only possible if children attend school regularly. Research shows that chronic absences—defined as missing two or more days of school per month—are a warning sign for a student dropping out (Bennett, 2017). The effects of missing school run deeper, however, as students who miss more school than their peers score lower on the National Assessment for Educational Progress, sometimes demonstrating skill levels one to two years lower than their peers (Ibid.). Clearly, the educational progress that children make is impacted by absence from school, and chronic absences ultimately impede a student's ability to further his or her education.

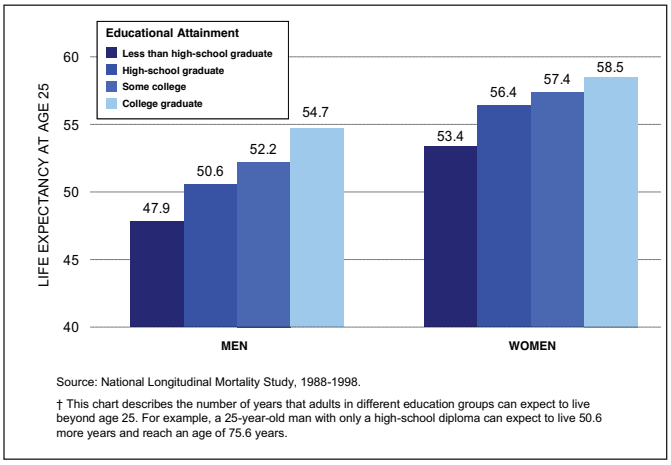


FIGURE 35: EDUCATIONAL ATTAINMENT AND LIFE EXPECTANCY (SOURCE: RWJF, 2011)

During community focus groups held in August 2019 in each of the communities, common themes emerged about educational attainment and bus transport. For example, in rural areas, the bus ride round trip can be between two and three hours long. Children riding the bus arrive at school tired and hungry, as they are not allowed to bring food on the bus. There are also concerns about how well-attended children are while riding the school bus, creating an environment that allows for bullying, asthma exacerbation, and other health and wellness issues. These long trips represent a high and chronic exposure to diesel bus pollution for children.

One way to positively impact the asthma care for children living in communities with low socioeconomic status and a high percentage of people of color is to invest in clinical services where children live, learn, and play. This could be successfully implemented by installing or expanding School-Based Healthcare Centers (SBHCs), as children spend a great deal of their time at school. SBHCs can provide on-site medical care for the most prevalent childhood medical needs (e.g., diabetes, asthma, immunizations) as well as provide medical care for those who do not have access to it outside of the SBHC. Most importantly, they can provide medical care that helps ensure children do not miss valuable classroom time, monitoring students' health to catch problems early so that they do not become larger issues that result in long stints away from school (New Mexico Alliance for School-Based Health Care, 2019). In fact, a 2010 study conducted within the Albuquerque Public School system explored whether in-school asthma education had meaningful impacts on asthma outcomes, as well as how long these positive outcomes lasted for the children studied. They found that although working to increase asthma management self-efficacy results in improvements in asthma outcomes among these students, asthma education must be continued throughout the child's education as he or she progresses through middle and high school (Greenberg et al., 2010). In other words, **providing fully funded certified nursing positions in schools to provide both asthma education and management is another important factor in increasing children's educational attainment within these selected communities.**

A 2015 study by scientists at the University of Michigan and the University of Washington found that when their schools adopted cleaner fuels and technologies, children had improved lung function and were absent less often (Adar et al., 2015). Further, a 2019 study conducted in the state of Georgia looked at 10 years of student academic records and compared districts that had invested in clean technologies to those that hadn't. Those school districts that invested in clean school bus technology had "significantly higher English test scores and slightly higher math scores," as compared to those that had not, after controlling for other compounding factors (Austin, Heutel, & Kreisman, 2019). **Thus, an investment in cleaner school bus technologies would not only improve the health of children riding these school buses, but it would also decrease absenteeism and improve educational attainment opportunities.**

EDUCATIONAL ATTAINMENT
RECOMMENDATIONS

1. **School districts should work to replace diesel-powered school buses with electric-powered (zero-emission) school buses, prioritizing communities with a large percentage of low-income, Latino/Hispanic, or Indigenous populations, in particular those whose students are burdened by long bus rides from rural communities. School districts should**

    a) **use their annual budgets to replace diesel school buses with electric school buses;**
    b) **use their budgets to purchase and install electric infrastructure, such as solar panels, storage batteries, and charging stations, to accommodate electric school buses;**
    c) **apply for funding from the Volkswagen settlement to replace diesel school buses with electric school buses; and**
    d) **monitor other funding sources, including the U.S. EPA's Clean School Bus USA funding, to continue working toward the full replacement of diesel buses with electric school buses.**

2. **School districts should ensure that students in grades K–12 have access to school-based health centers to provide for the existing health care needs of students, so that they do not miss school unnecessarily.**

3. **School districts should fully fund certified nursing staff positions with certified nurses (not nursing aides) in schools, especially those in communities with poorer air quality or high rates of childhood asthma or disabilities, so that in-school care is readily available to students, ensuring that they do not miss school unnecessarily.**

4. **School districts should fund after-school tutoring programs to assist students who miss school due to illness, such as asthma, so that they may stay up-to-date on their assignments/workload. They should prioritize funding for schools in communities where diesel school buses require students to ride 30 minutes or more to and from school, as these bus rides represent a clear asthma trigger.**

VI. IMPACT OF ELECTRIC SCHOOL BUSES ON INCOME AND JOB SECURITY

I miss a whole day of work because I have to take my child to the hospital. I can't work because my child gets sick so much. I am an hourly wage employee, and it's hard for me to take off work to take my child to the doctor.

—Comments from residents at community forum, August 2019

Parents of school-aged children, in particular parents working in low-wage jobs, face stressors beyond the financial burdens of trying to make ends meet on less than the average American income (Chaudry et al., 2012). The realities of working a low-wage job include "low earnings, workplace inflexibility and limited paid time off, and high job instability. In addition, low-wage jobs are disproportionately more likely to have nontraditional and irregular work schedules as well as inflexible work policies" (Cuandry, Pedroza, & Sandstrom, 2012, p. 1). The lack of workplace flexibility, either because of the employer's policies or the nature of the work itself (e.g., the nature of the work may not allow for flexibility because it is client-driven), creates a culture in which working parents of school-aged children lack flexibility should their child become ill and they need to take time off from work (Ibid.). Further, the lack of benefits including paid time off, schedule flexibility, or other accommodations makes it difficult for low-income workers to respond to unexpected scheduling challenges, such as acute illness or personal emergencies, and so on (Ibid.).

Data for each of the communities of focus for this assessment show median household incomes lower than the national average (see **Community Profiles**). Further, poverty rates among children 0–18 years old in each community are more than twice the rate in the United States. According to a 2012 report based on the Bureau of Labor Statistics' American Time Use Survey, Latinos are least likely to have paid time off or workplace flexibility (Glynn & Farrell, 2012). This means that **in cases where a child falls ill and must miss school, a parent is often left to choose between their job or the health and well-being of their child.** In fact, low-income children are more likely to face health care problems while living in homes where parents lack the ability to take time off from work—whether paid or unpaid (Heymann, Toomey, & Furstenberg, 1999). According to a 2007 report, "Low-wage, low-income workers with children are disproportionately likely to be younger, Hispanic, live in one-parent families, and report being in fair or poor health compared with the average worker" (Acs & Nichols, 2007, p. 1). Each of the communities included in this assessment have a large proportion of Latino residents.

As has already been highlighted throughout this assessment, when children, particularly those with respiratory illnesses, are exposed to diesel emissions, especially while riding on the school bus to and from school, the likelihood that their asthma will be triggered increases. When a child's asthma is triggered, if proper medical attention cannot be delivered by the school nurse, a parent or caregiver must ensure that the child is cared for. This situation threatens parents' income and job security—not to mention the health and well-being of the child—when they may already be struggling to maintain their income and keep their jobs. Findings from a 2010 study (Figure 36) that explored the impacts of childhood asthma (uncontrolled versus controlled asthma) on caregivers' workplace absenteeism, performance, and productivity suggest that,

> Children with uncontrolled asthma are far more likely to experience asthma-related nighttime awakenings, and it is not at all unlikely that their caregivers too are awakened more often at night. This could be a driving factor in impaired work performance the next day. **With decreased overall productivity and the concerns of caring for their child, issues of job security may also be of concern for parents** (Dean et al., 2010, p. 9).

Beyond the potential for lost productivity or job security are the financial constraints of caring for a child with asthma. When a child's asthma is triggered due to exposure to diesel exhaust from a school bus, in the best-case scenario, the child's in-home asthma medications will be sufficient to control the child's respiration. In extreme cases, where an emergency room visit or hospitalization is necessary, these interventions can be costly (Nunes, Pereira, & Morais-Almeida, 2017). To support income and job security for low-income working parents, such as the parents living within the target communities of this assessment, state and local agencies must take policy action.

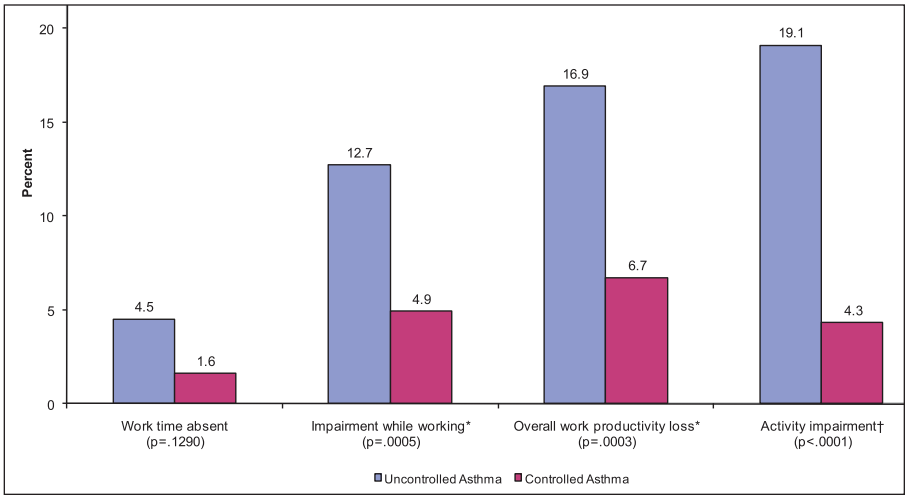


FIGURE 36: WORK PERFORMANCE SCORES FOR EMPLOYED CAREGIVERS BY ASTHMA CONTROL (SOURCE: DEAN ET AL., 2010)

During a series of community focus group meetings held in each of the communities in August 2019, common themes emerged about income and job security and school bus transport. In the rural areas, parents reported that, if they had the choice, they would rather drive their child to school than put them on a school bus. However, due to the cost of gasoline and the need to re-

port to their jobs, most of these parents were unable to drive their children to school. Forum participants shared their employment status, and the groups largely comprised hourly low-wage workers, disabled adults, and mothers who work at home. The participants expressed the difficulties they face when their children must miss school due to asthma or mental illness. **There is no paid or sick leave for these parents to use, and those that could work expressed worry about losing their jobs when they missed work.**

INCOME AND JOB SECURITY
RECOMMENDATIONS

1. **School districts should work to replace diesel-powered school buses with electric-powered (zero-emission) school buses, prioritizing communities with a large percentage of low-income, Latino/Hispanic, or Indigenous populations, in particular those whose students are burdened by long bus rides from rural communities. School districts should**

    a) **use their annual budgets to replace diesel school buses with electric school buses;**
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    c) **apply for funding from the Volkswagen settlement to replace diesel school buses with electric school buses; and**
    d) **monitor other funding sources, including the U.S. EPA's Clean School Bus USA funding, to continue working toward the full replacement of diesel buses with electric school buses.**

VII. SUMMARY OF FINDINGS AND RECOMMENDATIONS

SUMMARY OF FINDINGS

In response to community concerns about the negative impacts that diesel school bus emissions have on physical and mental health, educational attainment, and income and job security, CVNM Education Fund initiated this assessment. At a series of community forums, discussions, and focus groups, families in the target communities—South Valley, Westgate Heights/Vecinos, Gallup, and Española—described how diesel school bus emissions are currently disrupting their lives, and they discussed the benefits that could result from an investment in electric school buses.

HOW WOULD ADOPTING ELECTRIC SCHOOL BUSES IMPACT PHYSICAL AND MENTAL HEALTH?

Replacing diesel school buses with electric school buses in the target communities would likely have the following benefits on the physical and mental health of school-age children and their families:

- A decrease in respiratory illnesses or episodes in children
- A resulting decrease in stress, depression, and anxiety in the parents and the associated loss of job insecurity
- An increase in student well-being due to stronger social networks and school performance

HOW WOULD ADOPTING ELECTRIC SCHOOL BUSES IMPACT EDUCATIONAL ATTAINMENT?

Replacing diesel school buses with electric school buses in the target communities would likely have the following benefits on the educational attainment of children and young adults in these communities:

- A decrease in missed days of school due to respiratory illness by eliminating the presence of a significant trigger of asthma (e.g., diesel)—the leading cause of missed school days
- An increase in school performance indicators (e.g., test scores, grade point averages) due to children missing less school
- A resulting increase in rates of high school graduation and college admission

SUMMARY OF FINDINGS (cont.)

HOW WOULD ADOPTING ELECTRIC SCHOOL BUSES IMPACT INCOME AND JOB SECURITY?

Replacing diesel school buses with electric school buses in the target communities would likely have the following benefits on the income and job security of the parents of school-aged children:

- A decrease in sick or unpaid leave from work required by parents by eliminating a key trigger of asthma (diesel exhaust from school buses)—the leading cause of missed school days among school-aged children
- An increase in parent job performance and job security along with a decrease in economic or emotional stress when parents do not have to miss work as often to care for sick children
- An increase in critical income necessary for family survival as a result of parents missing work to care for sick children less often
- An increase in employer satisfaction due to a consistent work force presence and strong work product when parents do not have to miss work as often to care for sick children

VII. SUMMARY OF FINDINGS AND RECOMMENDATIONS

RECOMMENDATIONS:

PHYSICAL AND MENTAL HEALTH

1. **School districts should enforce bus idling restrictions to ensure that students at the schools and those in the surrounding communities do not experience unnecessary exposure to air pollution from diesel school buses.**

2. **School districts should work to replace diesel-powered school buses with electric-powered (zero-emission) school buses, prioritizing communities where there are a large percentage of low-income, Latino/Hispanic, or Indigenous populations, in particular those whose students are burdened by long bus rides from rural communities. School districts should**

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    c. **apply for funding from the Volkswagen settlement to replace diesel school buses with electric school buses; and**
    d. **monitor other funding sources, including the U.S. EPA's Clean School Bus USA funding, to continue working toward the full replacement of diesel buses with electric school buses.**

3. **School officials should work with their school bus contractors to initiate mitigation efforts immediately with the aim of decreasing exposure while the transition from diesel to electric is underway. These efforts can include installing filters on diesel buses to minimize diesel exposure for riders of diesel buses and ensuring that bus drivers seat students at the front of the bus first (where diesel levels are lower).**

4. **The New Mexico Environment Department, in administering the funds under the Volkswagen settlement, should encourage the replacement of diesel school buses with electric school buses.**

5. **The New Mexico Environment Department should work with the Navajo Nation to obtain and make publicly available any air quality monitoring data generated in Navajo lands.**

VII. SUMMARY OF FINDINGS AND RECOMMENDATIONS

RECOMMENDATIONS:

EDUCATIONAL ATTAINMENT

1. **School districts should work to replace diesel-powered school buses with electric-powered (zero-emission) school buses, prioritizing communities with a large percentage of low-income, Latino/Hispanic, or Indigenous populations, in particular those whose students are burdened by long bus rides from rural communities. School districts should**

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VII. SUMMARY OF FINDINGS AND RECOMMENDATIONS

RECOMMENDATIONS:

INCOME AND JOB SECURITY

1. **School districts should work to replace diesel-powered school buses with electric-powered (zero-emission) school buses, prioritizing communities with a large percentage of low-income, Latino/Hispanic, or Indigenous populations, in particular those whose students are burdened by long bus rides from rural communities. School districts should**

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    d) **monitor other funding sources, including the U.S. EPA's Clean School Bus USA funding, to continue working toward the full replacement of diesel buses with electric school buses.**

VIII. CONCLUSION AND NEXT STEPS

Each year, New Mexico school districts decide on their budgets for bus transportation. These budgets dictate how many school buses will serve each school and district. On average, a school bus remains in a fleet for fifteen years, which means that districts purchase one new bus on average for their fleet each year. Moving forward, a critical opportunity exists to phase out diesel-fueled school buses that negatively impact **physical and mental health, educational attainment,** and **income and job security** of school-aged children and their families as districts pass policies to move toward electrifying school bus fleets (see **APPENDIX VI: CVNM Education Fund Public Comment, June 29, 2019**).

In 2015, it was revealed that Volkswagen (VW) had rigged the software in its diesel engines to turn on the engine's emissions controls only during emissions testing. In 2016, VW agreed to a $14.7 billion settlement to compensate vehicle owners, invest in zero-emission vehicles, and establish a mitigation fund to be distributed to states. As part of this settlement, New Mexico received just under $18 million. These funds have been earmarked for programs that transition to electric vehicles, newer diesel, or alternative-fuel vehicles. **Organizations can apply for funding that "is designated for the replacement of eligible diesel-fueled vehicles with alternate-fueled or all-electric vehicles, as well as light duty zero-emission vehicle supply equipment."** In addition, in 2013, the U.S. Environmental Protection Agency launched Clean School Bus USA—a program that provides funding and resources to school dis-tricts and bus companies looking to upgrade their fleets. In 2015 alone, the agency allocated more than $7 million to 85 school districts (out of 530 applicants) across the country (U.S. En-vironmental Protection Agency, 2019c), and New Mexico school districts appear to have not yet taken advantage of this funding source to replace their dirty school bus fleets.

This report would be remiss if it did not acknowledge that some steps have already been taken to address this issue in New Mexico. The Albuquerque School District does have anti-idling restrictions, for example, and it has also taken advantage of VW and state budget funding to replace almost half of its fleet of school buses with buses with newer engines that are qualified as clean diesel vehicles (email communication with Royce Binns, Executive Director of Trans-portation, Albuquerque Public Schools, 8/15/19). While every effort to decrease children's ex-posure to diesel emissions while riding school buses is needed, a move toward full electrification is what will result in the best outcomes for student health, and this technology is readily available. Given that the funding is available for school districts in the state of New Mexico to completely transition away from combustion engines in their school bus fleets, **bold action is required** to move toward clean alternative fuels.

While the upfront costs of electric buses are higher than those for diesel buses, evidence from case studies of cities choosing to move beyond combustion engines to electric ones shows that **not only are these vehicles non-emitting, but they are also proving to be less expensive and more reliable to operate in the long term, with cost savings in fuel and maintenance being readily recouped** (U.S. PIRG Education Fund, 2018). Further, unique funding mechanisms exist where school districts are willing to be bold and move away from traditional combustion engines. By supporting the developing industry of electric vehicle manufacturing, school districts that opt for this technology are supporting an industry invested in reducing the harmful effects of air pollution on community health.

What's more, replacing diesel-powered buses with electric-powered buses reduces greenhouse gas emissions that are contributing to global climate change. Diesel exhaust contains significant levels of carbon dioxide, a primary greenhouse gas. If electric buses are powered by renewable energy sources, such as solar energy, they do not contribute to the emission of greenhouse gases or other harmful pollutants. And because electric motors are more efficient than internal combustion engines, even if electric buses derive their power from fossil fuel combustion, fewer pollutants will be emitted.

Given the myriad benefits that result from the electrification of school buses, and given the existing funds and programs available to assist in electrifying school bus fleets, a tremendous opportunity exists to discard polluting diesel buses in favor of clean electric buses. Taking this action will have a lasting positive impact on the health and well-being of school-aged children and their families across New Mexico.

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Clean Zero Emission School Buses in New Mexico and the Impacts on Health Project:

Research Questions + Measures

QUESTIONS	MEASURES	TYPES OF METHODS	NOTES & QUESTIONS
Scale of the Problem			
What is the current amount of school buses used in New Mexico? In Bernalillo, Rio Arriba, McKinley County?	● Number of school buses in the state ● Average number of buses in Bernalillo County ● Average number of buses in McKinley County ● Average number of buses in Rio Arriba County ● Average number of hours buses are used in all three counties ● Total number of hours buses are used in three counties	Secondary data (administrative)	
Who are the people and communities most impacted in NM?	● Demographics of students who ride school buses ● Frequency of school bus usage per student ● Communities near bus idling stations ● Demographics of communities where bus idling stations are located (e.g., race/ethnicity, age, income, renters, families, gender, education)	Secondary data (administrative or Census)	*We can gather data through Census, but if it is not available we can gather information from the counties we are conducting the HIA.*

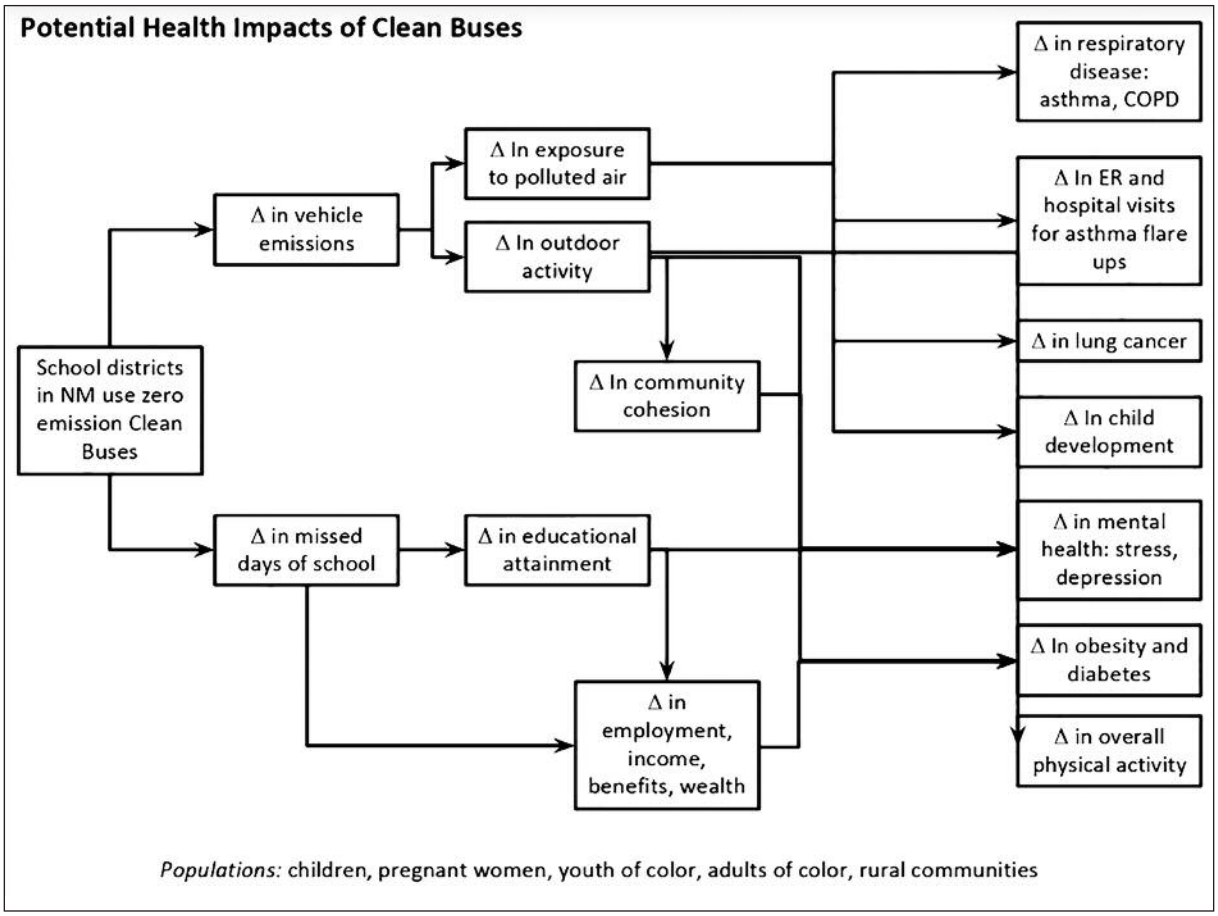
			Look into capacity to GIS map where the idling stations are and then do a GIS analysis of the population within some distance.
How many people from each of the counties (Bernalillo, McKinley, and Rio Arriba) suffer from health issues related to pollution?	● Number of lung cancer cases ● Childhood asthma rates ● Adult asthma rates ● Average number of new cases of asthma in children and other respiratory illnesses in the past years ● Average rates of cardiovascular disease ● Average rates of lung cancer in adults in the counties being researched ● Average rates of premature birth ● Life expectancy in the counties being researched	Secondary data (administrative) & literature	*Look into creating a map that portrays the health changes in each of the counties and connect to where the most buses are used and what is the relation with this.* *- Map out idling stations in three counties* *Look into data on asthma rates in counties being researched*
What are the impacts of other alternate fueled school buses compared to diesel?	● Cost of alternate fueled vehicles ● Life of alternate fueled vehicles ● Pollution emitted from school buses.	Secondary data	
Where does the pollution in the counties we are working in come from?	● Pollution studies ● Average pollution from diesel school buses (not sure if this can be figured out)	Secondary data	*Look into NMIPL's study on the state's pollution and figure out other sources.*

Impacts on Health			
How do community members from Bernalillo, McKinley, and Rio Arriba County feel being exposed to diesel pollution from school buses impacts their health and mental health?	Want to describe health status overall for the state and counties: ● Preventable hospitalizations and Emergency Room visits ● Health status ● Respiratory illnesses ● Mental health ● Chronic illnesses ● Chronic stress, depression More specific to experience of exposure to pollution from buses (and other sources) in the counties we are researching: ● Overall health status ● Respiratory illnesses ● Chronic stress, chronic depression, other mental health issues ● School days missed ● Work days missed ● Life expectancy	Secondary data & literature Focus groups and community conversations (story collection)	
What would make the experience of using school buses less burdensome?	● Take into consideration what has been done in other states and what impact that has had on communities.	Focus groups & literature	

Impacts on Communities			
How do diesel school buses, including the presence idling stations in communities throughout NM impact the livelihoods of children and families?	Describe co-incident community risk factors: ● Asthma, lung cancer, other health illnesses ● Educational attainment ● Work Want to describe perceptions of: ● Presence of idling stations and what it signifies for communities	Secondary data & literature Focus groups, key informant interviews	*Look into work because parents would have to miss work in the case that their kids suffer from asthma flare-ups.*
How do pollution and the illnesses it causes affect educational attainment?		Data & literature	
How do pollution and the illnesses it causes affect employment?			

APPENDIX II:

HEALTH IMPACT ASSESSMENT PATHWAY DIAGRAM



APPENDIX III:
MCKINLEY COUNTY SCHOOLS' BUS ROUTES IN MILES

Route	Special Route Miles	Elementary School	Middle School	High School	Total Route Miles
1RFT		24	56		80
4RFT		15	74		89
5RFT		6	66		72
6RFT		5	48	10	63
7RFT		5	60	11	76
8SEO	1	80		16	97
11RFT	1	64		4	69
14RFT		15	67		82
17RTF		18	85	10	113
18RTF		4	60	4	68
20RTF		17	90	27	134
22RTF	1	91		21	113
27RTF	4	80		20	104
29RTF		15	88	10	113
30RTF		15	95	10	120
34RTF	4	60		6	70
46RTF	1	102		29	132
48RTF		14	104	14	132
49RTF	2	92		12	106
51RTF		25	125	33	183
52RTF	1	60	20		81

APPENDIX III:
MCKINLEY COUNTY SCHOOLS' BUS ROUTES IN MILES

54RTF	1	65	15		81
56RTF	5	80		30	115
58RTF	1	60		17	78
61RTF	1	88		33	122
63RTF	1	42		15	58
70RTF		26	93		119
71RTF		20	76	44	140
73RTF	5	100		23	128
74RTF		20	49	28	97
75RTF	5	97		20	122
81RTF	5	92			97
83RTF	9	51		56	116
87SEO	1	103		25	129
88RTF	3	106		49	158
102RTF	1	82		5	88
103RTF		22	98	23	143
113RTF	1	110		4	115
202RTF	12	56			68
207RTF	1	61			62
210RTF	5	91		10	106
215RTF		14	50	24	88
216RFT	5	75		20	100

APPENDIX III:
MCKINLEY COUNTY SCHOOLS' BUS ROUTES IN MILES

219RTF	4	30			34
224RTF	2	103		10	115
226RTF	5	164		42	211
228RTF		18	146		164
234RTF		20	143	13	176
235RTF	9	54		6	69
237RTF	1	66			67
238RTF		10	94	12	116
239RTF	4	54		7	65
244RTF		10	45	12	67
248SEO	6	110		2	118
249RTF	5	120			125
250RTF		10	100	9	119
251RTF		21	90	25	136
256RTF	7	59		10	76
260RTF		10	90	30	130
261RTF		10	109	20	139
262RTF		10	60	23	93
263RTF	5	120		30	155
264RTF		10	91	27	128
267RTF		15	77	21	113
268RTF		10	120	5	135

APPENDIX III:
MCKINLEY COUNTY SCHOOLS' BUS ROUTES IN MILES

269RTF	2	86		20	108
270RTF		25	150	15	190
271RTF		1	102	12	115
272RTF		12	141	6	159
273RTF		10	177	21	208
274RTF		20	133	16	169
275RTF		96		10	106
276RTF		10	49	28	87
278RTF		20	121	21	162
279RTF		28	150	5	183
280RTF		33	110	18	161
281RTF		22	60	6	88
283RTF	2	122		29	153
284RTF		12	48	5	65
286RTF	5	54		18	77
287RTF		21	94	8	123
288RTF		30	70	48	148
289RTF	7	97		12	116
300SEO		20	109	20	149
302SEO	1	96		52	149
305SEO	2	68		8	78
306SEO		18	51	8	77

APPENDIX III:
MCKINLEY COUNTY SCHOOLS' BUS ROUTES IN MILES

308SEO		10	168	57	235
314SEO		25	125	25	175
216SEO	2	137		36	175
317SEO	1	90		20	111
318SEO	3	64			67
319SEO		10	268	26	304
320SEO		10	57	21	88
322SEO		25	169	5	199
1216RTF	1	67		20	88
1401RTF	3	81		14	98
1601RTF	2	127		40	169
1602RTF	1	166		13	180
1603RTF	3	103		2	108
1701RTF		10	115	33	158
1702RTF	2	90		10	102
1703RTF	5	113		60	178
1704RTF	2	84		22	108
1705RTF	5	9		20	34
1706RTF		10	97	30	137
1707RTF	5	122		17	144
1708RTF	5	130		30	165
1709RTF	5	100		21	126

APPENDIX III:
MCKINLEY COUNTY SCHOOLS' BUS ROUTES IN MILES

1710RTF		10	112	40	162
1711RTF	3	100		30	133
1712RTF	2	121		18	141
1713SEO	1	72		30	103
GRAND TOTALS	**195**	**6089**	**5260**	**1993**	**13537**

School Site	Ethnicity						
Elementary Schools	Asian	Black	Caucasian	Hispanic	Native American	Pacific Islander	Grand Total
Chee Dodge Elementary School			2	6	281		289
Catherine A. Mille Elementary School	1	1	2	11	329		344
Crownpoint Elementary School	2	2	2	1	323		330
Indian Hills Elementary School	1		31	59	190		281
Jefferson Elementary School	8		33	108	211		360
Lincoln Elementary School	4	2	6	85	165		262
Navajo Elementary School	2				275		277
Turpen Elementary School			15	50	337		402
Ramah Elementary School		1	32	5	128	3	169
Red Rock Elementary School	12	2	113	89	145		361
Roosevelt Elementary School		3	15	41	99		158
Rocky View Elementary School	2		9	54	225		290
Totals Elementary Schools	**32**	**11**	**260**	**509**	**2708**	**3**	**3523**

APPENDIX IV: MCKINLEY COUNTY SCHOOLS' DEMOGRAPHICS

School Site	Ethnicity						
Middle Schools	**Asian**	**Black**	**Caucasian**	**Hispanic**	**Native American**	**Pacific Islander**	**Grand Total**
Chief Manuelito Middle School	6	2	18	75	487		588
Gallup Middle School	12	2	50	124	246		434
Tohatchi Middle School		2		1	197		200
Thoreau Middle School		1	5	9	231		246
Navajo Middle School				1	123		124
Crownpoint Middle School	4		1	1	168	2	176
Totals Middle Schools:	**18**	**7**	**73**	**209**	**1161**		**1468**

APPENDIX IV: MCKINLEY COUNTY SCHOOLS' DEMOGRAPHICS

School Site	Ethnicity						
High Schools	**Asian**	**Black**	**Caucasian**	**Hispanic**	**Native American**	**Pacific Islander**	**Grand Total**
Gallup Central High School		1	2	29	183		215
Crownpoint High School	1		2	2	266		271
Gallup High School	7	3	16	142	687		855
Tohatchi High School		2		2	309	1	314
Miyamura High School	31	5	89	285	747		1157
Navajo Pine High School					110		110
Tse Yi Gai High School					84		84
Middle College High School	10	3	37	10	40		100
Ramah High School			28	6	131		165
Thoreau High School	2		5	9	362		378
Totals High Schools:	**51**	**14**	**179**	**485**	**2919**	**1**	**3649**

APPENDIX IV: MCKINLEY COUNTY SCHOOLS' DEMOGRAPHICS

School Site	Ethnicity						
	Asian	Black	Caucasian	Hispanic	Native American	Pacific Islander	Grand Total
Chief Manuelito Middle School	6	2	18	75	487		588
Gallup Central High School		1	2	29	183		215
Chee Dodge Elementary School			2	6	281		289
Catherine A. Mille Elementary School	1	1	2	11	329		344
Crownpoint Elementary School	2	2	2	1	323		330
Crownpoint High School	1		2	2	266		271
Gallup Middle School	12	2	50	124	246		434
Gallup High School	7	3	16	142	687		855
Indian Hills Elementary School	1		31	59	190		281
Tohatchi High School		2		2	309	1	314
Jefferson Elementary School	8		33	108	211		360
Miyamura High School	31	5	89	285	747		1157
Navajo Pine High School					110		110
Lincoln Elementary School	4	2	6	85	165		262
Navajo Elementary School	2				275		277
Crownpoint Middle School	4		1	1	168	2	176
Tse Yi Gai High School					84		84

Turpen Elementary School			15	50	337		402
Middle College High School	10	3	37	10	40		100
Navajo Middle School				1	123		124
Tohatchi Middle School		2		1	197		200
Ramah High School			28	6	131		165
Ramah Elementary School		1	32	5	128	3	169
Red Rock Elementary School	12	2	113	89	145		361
Roosevelt Elementary School		3	15	41	99		158
Rocky View Elementary School	2		9	54	225		290
Thoreau High School	2		5	9	362		378
Stagecoach Elementary School	4	5	7	60	224		246
Thoreau Middle School		1	5	9	231		246
David Skeet Elementary School	1	1	4	5	206		217
Thoreau Elementary School			12	14	291		317
Tohatchi Elementary School	2	1	3	3	222		231
Twin Lakes Elementary School	1			3	167		168
Del Norte Elementary School	2		12	146	317		477
John F. Kennedy Middle School	8	2	28	144	486		668
Grand Totals:	**123**	**41**	**579**	**1580**	**8992**	**6**	**11321**

APPENDIX V1:
CVNMEF PUBLIC COMMENT: JUNE 29, 2019

June 29, 2019

Elizabeth Bisbey-Kuehn
Chief, Air Quality Bureau
New Mexico Environment Department
525 Camino de los Marquez, Suite 1
Santa Fe, New Mexico 87505-1816
vw.info@state.nm.us

Subject: Comments on Volkswagen Beneficiary Mitigation Plan for New Mexico (Revised)

Dear Ms. Bisbey-Kuhen:

Conservation Voters New Mexico Education Fund and the New Mexico Environmental Law Center hereby submit the following comments on the *Volkswagen Beneficiary Mitigation Plan for New Mexico* (Revised May 31, 2019). We appreciate the opportunity to comment on the Revised Mitigation Plan. Overall, we think the Revised Mitigation Plan is a significant improvement over the original Mitigation Plan of July 24, 2018. We offer the following comments to strengthen the Mitigation Plan and to support the use of mitigation funds for replacing diesel powered vehicles – particularly school buses – with electric powered school buses.

COMMENTERS

Conservation Voters New Mexico Education Fund is a statewide, nonpartisan nonprofit organization committed to engaging the people of New Mexico in protecting our air, land, and water and the health of our communities. The Education Fund advances these goals by mobilizing people to advocate for conservation policy, enhancing the voting process, encouraging people to vote, cultivating conservation leaders, amplifying the voices of those most affected by environmental degradation, and working with communities to address environmental issues affecting their health and quality of life.

The New Mexico Environmental Law Center is a nonprofit public interest law firm that represents environmental and community organizations on a wide variety of environmental issues, including issues related to urban air pollution and climate change. Our clients include

community organizations in New Mexico whose members – and their children – suffer from respiratory problems, such as asthma, due to air pollution.

BACKGROUND

The Revised Mitigation Plan stems from the settlement of litigation against Volkswagen AG and several affiliated car companies that installed in many of their automobiles devices to defeat pollutant emission controls. On January 4, 2016, the United States, on behalf of the United States Environmental Protection Agency (EPA), filed a lawsuit against Volkswagen AG, Audi AG, Volkswagen Group of America, Volkswagen Group of America Chattanooga Operations, LLC, Dr. Ing h.c. F Porsche AG, and Porsche Cars North America, Inc.[1] The complaint alleges that Volkswagen and the affiliated car companies installed in automobiles sold in the United States computer software that detected when an emission test was in progress and automatically reduced the emissions of nitrogen oxides (NO_X) so as to pass the emission test. NO_X emissions during an emission test consequently were not representative of – and were considerably lower than – NO_X emissions during normal operating conditions. The sale of automobiles with such computer software is a violation of the federal Clean Air Act[2] and implementing regulations. The United States complaint sets forth four claims for various violations of section 203(a) of the Act,[3] all related to importing and selling automobiles with devices designed to defeat or bypass emission controls. The State of California filed a similar lawsuit on June 28, 2016 for violations of California law.

On October 25, 2016, the court entered a Partial Consent Decree among the United States, California, Volkswagen AG, and some of the other defendants, and on May 17, 2017, the court entered a Second Partial Consent Decree among the United States, California, Volkswagen AG, and the other defendants. These two decrees embody a partial settlement of the litigation. Under the settlement, Volkswagen and the other defendants have set up a State Mitigation Trust and a Tribe Mitigation Trust, and they have paid a total of $2.925 billion into the trusts. Trust funds must be spent for environmental mitigation projects that reduce the emissions of NOx in areas where noncompliant automobiles are or have been operated. The State Mitigation Trust consists of $2,865,635,889.38. This amount has been allocated among the beneficiaries: the 50 states, the District of Columbia, and Puerto Rico. A total of $17,982,660.90 has been allocated to New Mexico under the State Mitigation Trust Agreement.[4]

As a beneficiary to the State Mitigation Trust Agreement, the State of New Mexico must prepare a mitigation plan as a prerequisite to receiving funds from the State Mitigation Trust. Accordingly, the Environment Department prepared the Revised Mitigation Plan to describe how it intends to use the settlement funds allocated to New Mexico under the trust agreement.

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[1] *In re: Volkswagen "Clean Diesel" Marketing, Sales Practices, and Products Liability Litigation*, MDL No. 2672 CRB (JSC) (N.D. Cal. filed Jan. 15, 2016).

[2] 42 U.S.C. §§ 7401 to 7671q.

[3] 42 U.S.C. § 7522(a).

[4] Environmental Mitigation Trust Agreement for State Beneficiaries (Oct. 2, 2017).

COMMENTS

The comments of the Education Fund and the Law Center mostly fall into three broad but related and overlapping categories. First, the Revised Mitigation Plan should discuss in more detail the adverse health effects of diesel exhaust. Second, the Revised Mitigation Plan should express a clear preference for replacing diesel-fueled vehicles with electric vehicles and infrastructure. Third, the Revised Mitigation Plan should place greater emphasis on environmental justice concerns. We address each of these categories in turn. We also have a few, mostly minor, miscellaneous comments addressed below.

To facilitate the incorporation of our comments into the Revised Mitigation Plan, we propose specific revised and expanded text that can be inserted into the document. All factual statements in our proposed text are supported with citations to authoritative references. All of the references are available on the internet, but we would be happy to provide you with electronic copies of any or all of the referenced documents upon request.

1. Health Effects of Diesel Exhaust

We recommend that the Revised Plan's discussion of the health effects of diesel exhaust pollution be expanded with more detail. As currently drafted, the Revised Plan briefly discusses health effects from inhalation of ozone and particulate matter, but it makes almost no mention of the health effects from inhalation of nitrogen oxides (NO_X).[5] An expanded discussion of the health effects of these pollutants will help educate the public on the health and environment benefits of phasing out diesel engines. It will also lend support to the Environment Department's efforts to replace diesel engines.

At pages 3-6 of the Revised Mitigation Plan, we recommend replacing the section entitled "Pollutants of Concern" with the following two sections:

Pollutants Associated with Diesel-Fueled Vehicle Exhaust

Nitrogen Oxides

Nitrogen oxides (NO_X) are a family of poisonous, highly reactive gases. These gases form when fuel is burned at high temperatures. NO_X pollution is emitted by automobiles, trucks and various non-road vehicles (e.g., construction equipment, boats, etc.) as well as industrial sources such as power plants, industrial boilers, cement kilns, and turbines. NO_X often appears as a brownish gas. It is a strong oxidizing agent and plays a major role in the atmospheric reactions with volatile organic compounds (VOCs) that produce ground-level ozone (smog) on hot summer days. EPA has set National Ambient Air Quality Standard (NAAQS) and motor vehicle emission standards for NO_X under the Clean Air Act

[5] *Volkswagen Beneficiary Mitigation Plan for New Mexico* (Revised May 31, 2019), pp. 3-6 (hereinafter *Revised Mitigation Plan*).

Diesel engines operate at a higher temperature and pressure than gasoline engines. These conditions favor the production of NO_X gases.

The NMED is using data from the U.S. EPA's 2014 National Emission Inventory (NEI) to identify the state's NO_X emissions, specifically NO_X emissions from diesel-powered vehicles. Review of the NEI will assist the NMED in identifying those areas within the state that are impacted by mobile source diesel emissions.

The 2014 NEI estimated that more than 98,970 tons of NO_X were emitted from mobile sources in New Mexico. Figure 4 illustrates the major NO_X sources within the state and their percentage contribution. Figure 5 breaks down the statewide mobile NO_X sources and their percent contribution.

[Figure 4]

Mobile source emissions made up 44% of the total statewide NO_X emissions. Statewide NO_X emissions from diesel-powered vehicles and equipment were estimated at 74,000 tons of NO_X, with on-road heavy-duty diesel making up 44%, or 43,860 tons, of the total. The high percentage of on-road heavy-duty diesel is attributable to the state's classification as a Freight Bridge State. The majority of diesel truck traffic passes through the state in an east-west direction. Figure 6 provides the NO_X emissions, in tons for 2014, associated with on-road heavy-duty diesel-fueled vehicles and rail by county.

[Figure 5]

Ozone

Ozone is formed in the atmosphere from the combination of NO_X and VOCs in the presence of sunlight. EPA has set NAAQS for ozone.

Two air monitors in southern Doña Ana County (one in Santa Teresa near the border crossing and one in Sunland Park at the Desert View Elementary School) have shown exceedances of the NAAQS for ozone, based on monitor data from 2014 to 2016. These monitors are located near El Paso, Texas, and Ciudad Juárez, Chihuahua, Mexico. All other monitors operated by the New Mexico Environment Department show compliance with the NAAQS; however, ozone levels measured in the towns of Carlsbad and Hobbs, and at Navajo Lake, are close to exceeding the NAAQS.

Particulate Matter

Under the Clean Air Act, particulate matter is divided into two categories: particles finer than 10 microns in diameter but greater than 2.5 microns (PM_{10}), and particles finer than 2.5 microns in diameter ($PM_{2.5}$). EPA has set NAAQS for both PM_{10} and $PM_{2.5}$.

Diesel particulate matter (PM, also abbreviated DPM) is a complex mixture of solid and liquid material. There is presently one nonattainment area for PM_{10} within Doña Ana County. An area of Anthony, NM, which lies on the border of Texas and New Mexico, is a PM_{10} nonattainment area. This area was designated nonattainment for PM_{10} by the EPA in 1991. Windblown dust frequently results in exceedances of the NAAQS for PM_{10} and $PM_{2.5}$ in southern Doña Ana and in Luna counties during the spring season. Other areas of New Mexico also can be affected by dusty conditions during periods of high winds.

Health Effects Associated with Diesel-Fueled Vehicle Exhaust

The tailpipe exhaust from diesel-fueled motor vehicles contains many harmful pollutants, including nitrogen oxides (NO_X), carbon monoxide (CO), particulate matter, benzene, and polycyclic aromatic hydrocarbons. These pollutants are particularly harmful to the health of children and the elderly. According to EPA, chronic (long-term) inhalation exposure to diesel exhaust is likely to pose a risk of lung cancer in humans and is also likely to cause non-cancer harm to lung tissues. Acute (short-term) exposure can cause irritation and inflammation of the lungs. (EPA 2002). More recent studies have linked diesel exhaust to asthma.

Diesel-fueled motor vehicles also emit carbon dioxide (CO_2) and nitrous oxide (N_2O), both of which are greenhouse gases that contribute to global climate change.

The harmful health effects of some of the individual pollutants in diesel exhaust have been studied extensively.

Nitrogen Oxides

According to EPA, exposure to NO_X irritates the lungs and can lead to pulmonary disease and respiratory infection. It exacerbates asthma. Long-term exposure can lead to asthma and chronic bronchitis. (EPA 2016).

Carbon Monoxide

According to EPA, carbon monoxide (CO) exposure can lead to cardiovascular disease and respiratory disease. (EPA 2010).

Ozone

According to EPA, short-term exposure to ozone can have adverse respiratory effects, including lung inflammation, decreased lung function, increased susceptibility to lung disease, and asthma. Short-term exposure to ozone also likely has adverse cardiovascular effects. Recent studies also show a causal connection between short-term ozone exposure and mortality. (EPA 2013).

People most at risk from breathing air containing ozone include people with asthma, children, older adults, and people who are active outdoors, especially outdoor workers. Children are at greatest risk from exposure to ozone because their lungs are still developing and they are more likely to be active outdoors when ozone levels are high, which increases their exposure. Children are also more likely than adults to have asthma.

Particulate Matter

According to EPA, exposure through inhalation of particulate matter can have adverse respiratory effects, including lung inflammation, decreased lung function, increased susceptibility to lung disease, and aggravation of asthma. It can also have adverse cardiovascular health effects, including coronary heart disease and congestive heart failure. Health effects vary depending on the source and size of the particulates. (EPA 2009).

The particles in diesel exhaust are of special concern because, due to their respirable size, they can penetrate deep into human lungs. The composition of DPM includes many species that are known for their adverse health effects, including several carcinogens.

Benzene

According to the Agency for Toxic Substances and Disease Registry (ATSDR), benzene is a known human carcinogen. Inhalation of benzene can cause drowsiness, dizziness, headaches, rapid heart rate, and respiratory irritation. Long-term inhalation of benzene can cause blood disease, including leukemia, and damage to reproductive organs. (ATSDR 2007).

Asthma is associated with many of these pollutants, and asthma is increasingly prevalent in New Mexico. The New Mexico Department of Health reported in 2014 that from 2011 to 2012, 14.3% of New Mexico adults 18 years of age or older reported they had been diagnosed with asthma in their lifetime and 9.6% reported they still have asthma. During the same period, 13.6% of New Mexico children were reported to have been diagnosed with asthma in their lifetime and 9.0% were reported to still have asthma. The current asthma prevalence

estimate equals approximately 150,000 adults and 47,000 children in New Mexico who have the disease. (N.M. Dept. of Health 2014). Moreover, the prevalence of asthma has increased steadily since 2000. (N.M. Coalition on Asthma). Asthma is more common in adults and children from households with low incomes. (N.M. Dept. of Health 2014). Among children, asthma is the leading cause of missed school days due to chronic illness. (N.M. Dept. of Health 2009).

2. Preference for Electric Vehicles and Infrastructure

We also recommend that the Revised Plan state a clear preference for replacing diesel-powered engines with electric-powered motors and infrastructure. Older diesel engines should not be replaced with newer diesel engines. Nor should they be replaced with alternative fuel vehicles, such as compressed natural gas or liquid natural gas, except in exceptional circumstances. We have three reasons for supporting electric vehicles over other alternatives.

First, although natural gas engines are generally less polluting than diesel engines, and newer diesel engines are generally less polluting than older diesel engines, all internal combustion engines emit significant levels of harmful pollutants and greenhouse gases. There is no such thing as "clean diesel." Electric engines, on the other hand, are free of harmful emissions. Even if the source of the electricity used to charge the vehicle battery is derived from fossil-fuel combustion (e.g., a coal- or gas-fired power plant), the combustion will contribute less air pollution in densely populated urban areas. Ideally, the vehicle batteries can be charged using solar (or wind) energy, which is plentiful in New Mexico, and which does not emit harmful air pollutants.

Second, electric motors are more energy-efficient than internal combustion engines. They have fewer moving parts and require less maintenance. Other than the batteries, electric engines have a longer useful life.

Third, the manufacture of electric vehicles is a developing industry. By giving preference to electric vehicles, the Department can promote and help advance a technology that can reduce the emission of harmful pollutants and greenhouse gases enormously.

We recognize that the Revised Plan, as currently drafted, places greater emphasis on electric vehicles than did the original plan. But it seems to place nearly equal emphasis on alternative fuel vehicles. For example, the original State Mitigation Plan stated one of the Department's listed goals would be to "[f]ocus on funding projects that repower or replace older diesel-fueled vehicles and engines."[6] This goal would support projects that simply replace older diesel engines with newer model diesel engines. The Revised Plan, in contrast, states that the Department will "[f]ocus on funding projects that repower or replace older diesel-fueled vehicles and engines *with those that are all-electric or utilize an alternate fuel*."[7] We appreciate this

[6] *Volkswagen Beneficiary Mitigation Plan for New Mexico* (July 24, 2018), p. 2.

[7] *Revised Mitigation Plan*, p. 3 (emphasis added).

change; it is a substantial improvement over the original plan. But we believe the goal can and should give a clearer preference to electric vehicles and infrastructure.

We therefore recommend that the first numbered goal be rewritten as follows:

> Focus on funding projects that repower or replace older diesel-fueled vehicles and engines with those that are all-electric or utilize an alternate fuel, but with a clear preference for all-electric vehicles and engines and associated infrastructure.

We further recommend that a new paragraph be added after the numbered list of goals to make some of the same points we make above:

> The first item on the list states a preference for electric vehicles and infrastructure; it does so for several reasons. First, all internal combustion engines emit significant levels of harmful pollutants and greenhouse gases. Electric engines, by contrast, are free of harmful emissions. Even if the source of the electricity used to charge the vehicle battery is derived from fossil-fuel combustion (e.g., a coal- or gas-fired power plant), the combustion will contribute less air pollution in densely populated urban areas. Ideally, the vehicle batteries can be charged using solar (or wind) energy, which is plentiful in New Mexico, and which does not emit harmful air pollutants. Second, electric motors are more energy-efficient than internal combustion engines. They have fewer moving parts, require less maintenance, and (other than the batteries) have a longer useful life. Third, the manufacture of electric vehicles is a developing industry. Giving preference to electric vehicles helps advance a technology that can reduce the emission of harmful pollutants and greenhouse gases enormously.

3. Environmental Justice Considerations

We also recommend that the Revised Plan give greater consideration to environmental justice concerns. We appreciate that the Revised Plan lists "environmental justice areas" as priority areas for mitigation projects, and that it recites the EPA definition of "environmental justice."[8] These passages should be expanded, however, with more specific discussion.

We recommend that the following new numbered goal be added to the list at the end of page 2:

> 5. Prioritize projects located in environmental justice areas where low-income communities, Tribes, Pueblos or people of color have been disproportionately affected by air pollution.

[8] *Revised Mitigation Plan*, pp. 2, 16-17.

We also recommend that the section on Environmental Justice under High Priority Areas be expanded as follows:

Environmental Justice

The EPA defines Environmental Justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental, and commercial operations or policies. Meaningful involvement means that: (1) potentially affected populations have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment or their health; (2) the public's contribution can influence the regulatory agency's decision; (3) the concerns of all participants involved will be considered in the decision-making process; and (4) the decision-makers seek out and facilitate the involvement of those potentially affected. (EPA 2015).

Environmental justice areas commonly include communities or populations that are more adversely, disproportionately, or historically impacted by environmental issues than other communities because of geography, poverty, discrimination, limited political power, or similar factors. Environmental justice areas are often located within and adjacent to high pollution areas.

Environmental justice areas in New Mexico include low-income rural Hispanic communities, such as those in Rio Arriba and McKinley Counties in northern New Mexico; indigenous communities such as the pueblos and the Navajo and Apache reservations; and Hispanic, African American, and Asian urban communities, such as the International District and the South Valley in Albuquerque.

4. Miscellaneous Comments

We have a few additional comments that do not fall into any particular category, but are nevertheless important.

In the discussion of the Beneficiary Mitigation Plan, the amount of the state mitigation trust funds allocated to New Mexico, $17,982,660.90, is not specified.[9] It should be. The amount that has already been committed for approved projects should also be specified.

[9] *Revised Mitigation Plan*, p. 1.

The Environment Department proposes to use 15% of the allocated funds, the maximum amount allowed under the Trust Agreement, for light-duty zero-emission vehicle supply equipment.[10] This category would include electric vehicle charging stations. We support this proposal. The number of electric vehicle charging stations in New Mexico is inadequate.

Finally, the following list of references should be added at the end of the last page of the document:

REFERENCES

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N.M. Coalition on Asthma 2014. *Breathing Easy in New Mexico: Addressing the Burden of Asthma through Action, 2014-2019*.

N.M. Department of Health 2014. *The Burden of Asthma in New Mexico: 2014 Epidemiology Report* (Jan. 2014).

N.M. Department of Health 2009. *Managing Asthma in New Mexico Schools*.

[10] *Revised Mitigation Plan*, p. 14-15.

APPENDIX V1:
CVNMEF PUBLIC COMMENT: JUNE 29, 2019

Thank you for your consideration of our comments. Please do not hesitate to call or email either of us if you have any questions on these comments.

Sincerely,

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cc: Sandra Ely

Mines in McKinley County, NM

Mine	Owner	Land Status	Work Type	Minerals
16-16-8 Group	Phillips Petroleum Co.	Private		Uranium
30-C Uran Deposit	Mid-Continent Uran. Corp.	Federal		Uranium
Alta Mine		Private	Underground	Uranium Vanadium
Alta Mine	Anaconda Copper Co.	Private		Uranium
Amiran	John And Harry Desiderio	Private		Uranium
Anderson Pit		Private		Pumice
Andrews Pit				Sand and Gravel
Andrews Ranch Mine	Henry Andrews	Private		Uranium
Ann Lee Mine		Private	Underground	Molybdenum Selenium Uranium
Ann Lee Mine No 1	United Nuclear Corp	Private		Uranium
Armstrong Rock Quarry	Armstrong And Armstrong	Private		Sand and Gravel Stone
Barbara J Hz		National Forest		Uranium
Barbara Jean #1	Midcontinent Uran. Co.	Federal		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Barbara Jean #3	Midcontinent Uran. Corp.	Federal		Uranium
Beacon Hill		Private		Uranium Vanadium
Beacon Hill Mine	Holly Uranium Co.	Federal		Uranium
Becenti Mine		Federal		Uranium Vanadium
Berry Pit				Sand and Gravel
Bibo	Federal Uran. Co.	Private		Uranium
Black Hawk and Bunney		Private		Uranium Vanadium
Black Jack No. 1 Mine			Underground	Molybdenum Selenium Uranium
Black Jack No. 2 Mine			Underground	Uranium Vanadium
Black Jack Nos 1 & 2		Unknown		Uranium
Blackhorse 3		Private		Copper Uranium
Blackjack #1	Cobb Nuclear	Federal		Uranium
Blackjack #2	United Nuclear-Homestake Partners	Federal		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Blm Mineral Sale MS Nm-016-85-6				Sand and Gravel
Blue Peak		Private		Uranium
Bobcat Mine		Federal		Uranium
Borrego Pass Deposit				Uranium
Borrow Pit		Unknown		Sand and Gravel
Bottoms Claim	Lloyd Bottoms	Private		Uranium
Brown Const. Pit	Brown Const. Co.	Unknown		Sand and Gravel
Brown Const. Pit		Private		Sand and Gravel
Buckly No 1 Mine		Private		Uranium
Bucky #1 Mine	Holly Uranium Co.	Private		Uranium
Buffalo Springs Pit 63-4-S				Sand and Gravel
C & E Concrete Pit	Elkins Ranch Gravel Co.	Private		Sand and Gravel
Canyon Deposit				Uranium
Canyon Mulatto Uran. Deposit		National Forest		Uranium
Car-Ball 13 Uran. Deposit		Federal		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Chill Wills	Rialto	Private		Uranium
Church Rock #2				Uranium
Church Rock Mill (Facility)		Unknown		Uranium
Church Rock Mine	United Nuclear Corp.			Uranium
Church Rock No. 1 Mine		Private	Underground	Uranium
Cliffside Mine	Kerr-McGee Nuclear Corp.	State	Underground	Molybdenum Selenium Uranium Vanadium
Cobb Nuclear Section 12 Mine		Unknown		Uranium
Coolidge Pit	Gallup Sand And Gravel	Unknown		Stone
Corn Construction Pit				Sand and Gravel
Crownpoint Leach Project	Mobil Oil Corp.	Mixed		Uranium
Crownpoint Mine	Conoco, Inc	Private		Uranium
Crownpoint-Section 29 Mine				Uranium
Crownpoint-South Trend Deposit			Underground	Uranium
Dakot Mine		Private		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Dakota Mine	Dakota Mining Co.	Private		Uranium
Dalco #1	Midcontinent Uran. Corp.	Federal		Uranium
Dalton Pass - Section 30 Deposit				Uranium
Dalton Pass Deposit - Sections 24 and 25				Uranium
Dalton Pass Uranium Deposit - Section 28				Uranium
De Villiers #1 Mine	National Energy Corp	Private		Uranium
Defiance				Iron Thorium Titanium Zirconium
Delter		Private		Uranium
Delter Uran Deposit		Federal		Uranium
Diamond #2		Private		Uranium
Diamond #2 Mine	Shiprock Ltd.	Federal		Uranium
Diamond No. 2 Mine		Private		Uranium Vanadium

Mine	Owner	Land Status	Work Type	Minerals
Divide 25, 26, 27, 28 Uran. Deposits	Four Corners Expl. Co.	Federal		Uranium
Dog #1	Four Corners Expl. Co.	Federal		Uranium
Dog Flea Mine		Private		Uranium
Dog Group Mines		BLM Administrative Area		Molybdenum Uranium
Doris Extension		Unknown		Uranium
Doris Mine	Ranchers Expl. And Devel. Co.	Private		Uranium
Doris West Extension	Ranchers Expl. And Devel. Co.	Private		Uranium
Drift Mine		Private		Uranium
Dysart No. 1 Mine		Private	Underground	Uranium Vanadium
Dysart No. 2 Mine		Private	Underground	Uranium
Eagle Uran. Deposit		Private		Uranium
Elizabeth Group		Private		Uranium
Elkins Pit		Private		Sand and Gravel
Elkins Prewitt Pit	Buddy Elkins	Private		Stone, Crushed
Elkins Thoreau Pit #3	C. And E Concrete	Private		Sand and Gravel

Mine	Owner	Land Status	Work Type	Minerals
Evelyn Mine		Private		Uranium Vanadium
Evelyn Mine	Henry Andrews	Private		Uranium
Farris Mine	Westvaco Minerals Products	Private		Uranium
Febco Tunnel No 1		Private		Uranium
Federal Mine	Federal Uranium Corp.	Federal		Uranium
Flea Doris Extension	Four Corners Exploration Co.	Private		Uranium
Flea Mine	Four Corners Expl. Co.	Federal		Uranium
Fort Wingate Army Depot Well		Military Reservation		Geothermal
Foster Canyon Group	Foy, V. F.	National Forest		Iron Manganese
Foutz #2	Four Corners Uran. Co.	Federal		Uranium
Foutz No. 1 and No. 2 Mines		Private		Tungsten Uranium Vanadium
Foutz No. 3 Mine				Uranium Vanadium
Francis	Anaconda Copper Co.	Federal		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Francis Mine	Henry E. Andrews	BLM Administrative Area		Uranium Vanadium
Gallup Brick & Tile Co		Private		Clays
Glenn and Edith		Unknown		Uranium
Gossett	Smith Development	Federal		Uranium
Grants Perlite Mine		Private		Perlite
Grants Uranium District: Ambrosia Lake Subdistrict				Molybdenum Selenium Uranium Vanadium
Grants Uranium District: Church Rock Subdistrict				Uranium Vanadium
Grants Uranium District: Smith Lake Subdistrict				Iron Molybdenum Uranium Vanadium
Gravel Pit		Private		Sand and Gravel
Gravel Pit		National Forest		Sand and Gravel
Gravel Pit				Sand and Gravel
Gravel Pit				Sand and Gravel

Mine	Owner	Land Status	Work Type	Minerals
Gravel Pit				Sand and Gravel
Gravel Pit		Military Reservation		Sand and Gravel
Gravel Pit		Unknown		Sand and Gravel
Gravel Pit				Sand and Gravel
Gravel Pit		National Forest		Sand and Gravel
Gravel Pit		Private		Sand and Gravel
Gravel Pit		National Monument		Sand and Gravel
Gravel Pit		Private		Sand and Gravel
Gravel Pit		Unknown		Sand and Gravel
Gravel Pit	Wylie Brothers Construction Co.	Private		Sand and Gravel
Gravel Pit		Unknown		Sand and Gravel
Gravel Pit		Unknown		Sand and Gravel
Gravel Pit		National Forest		Sand and Gravel
Gravel Pit		Military Reservation		Sand and Gravel

Mine	Owner	Land Status	Work Type	Minerals
Gravel Pit		National Forest		Sand and Gravel
Gravel Pit		National Forest		Sand and Gravel
Gravel Pit		Private		Sand and Gravel
Gravel Pit		Military Reservation		Sand and Gravel
Gravel Pits		Mixed		Sand and Gravel
Gravel Pits		Military Reservation		Sand and Gravel
Gravel Pits		Unknown		Sand and Gravel
Green Pick 20 Uran Deposit		Federal		Uranium
Harmac Flat Top	Four Corners Expl. Co.	Private		Uranium
Haystack Butte Dist		Unknown		Uranium
Haystack Mine		Private		Uranium Vanadium
Haystack Mine	Todilto Explor. And Devel. Corp.	Private		Uranium
Haystack Open Pit		Unknown		Uranium
Haystack Underground		Unknown		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Hogan Mine		Private	Underground	Molybdenum Uranium
Hogan Mine	Four Corners Expl. Co.	Private		Uranium
Hogback Mine		BLM Administrative Area		Uranium Vanadium
Holly		National Forest		Uranium
Holly	Holly Uranium Co.	Federal		Uranium
Homestake-Sapin Mine No 15		Private		Uranium
Hope Mine		Unknown		Uranium
Hope Mine	Ranchers Expl. And Devel. Co.	Private		Uranium
Hyde Deposit	Hyde, A. W.	Unknown		Uranium
Hyde Mine		Private		Uranium
Ike #1	Rio De Oro Uranium Mines, Inc.	Federal		Uranium
Isabella	United Nuclear	Private		Uranium
Iyanbito Pit		Unknown		Sand and Gravel
Iyanbito Sand Pit				Sand and Gravel
J & S Enterprise		Private		Stone

Mine	Owner	Land Status	Work Type	Minerals
Jackpile Paguate Uranium Pit		Unknown		Uranium
Jackpot Mine	Jackpot Oil Co.	Private		Uranium
Johnny M Mine		Private	Underground	Arsenic Copper Molybdenum Selenium Uranium Vanadium
June Mine	Rio De Oro Uran Mines, Inc.	National Forest		Uranium
Junior Mine		Private		Uranium
Jurgensen Pit				Stone
Kent Nowlin Pit	United Nuclear	Private		Sand and Gravel
Kermac Mine 22		Private		Uranium
Kermac No 10 Mine		Private		Uranium
Kermac Nuclear Proc. Plant	Kerr-Mc Gee Nuclear Corp.	Private		Uranium
Kerr Mcgee Pit 31-13-9	Midwest Industries Co.	Private		Sand and Gravel
Kerr Mcgee Sec 17 Mine		Private		Uranium
Kerr Mcgee Sec 19 Mine		Private		Uranium
Kerr Mcgee Sec 22 Mine		Private		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Kerr Mcgee Sec 24 Mine		Private		Uranium
Kerr Mcgee Sec 29		Private		Uranium
Kerr Mcgee Sec 30 Mine		Private		Uranium
Kerr Mcgee Sec 30 West Mine		Private		Uranium
Kerr Mcgee Sec 33 Mine		Private		Uranium
Kerr-Mcgee Concentrator		Private		Molybdenum Uranium
Kerr-Mcgee Section 36 Mine		Private		Uranium
Kiewit Pit				Sand and Gravel
Kimbler Pit	Mc Kinley County	County		Sand and Gravel
Largo #4	Four Corners Exploration Co	Unknown		Uranium
Largo Uran Deposit		Private		Uranium
Last Chance Z Uran Deposit		Private		Uranium
Lawrence Elkins	Lawrence Elkins	Federal		Uranium
Mac #2	United Nuclear-	Federal		Uranium

Mine	Owner	Land Status	Work Type	Minerals
	Homestake Partners			
Mac No. 1	United Nuclear-Homestake Partner	Federal		Uranium
Maddox & Teague	Continental Divide Mining Corp.	Private		Uranium
Malpais	Four Corners Expl. Co	Federal		Uranium
Mariano Lake Mine	Gulf Mineral Resources Co.	Federal	Surface	Iron Uranium Vanadium
Marquez Canyon Mine	Kerr-McGee	Private		Uranium Uranium
Marquez Mine				Molybdenum Selenium Uranium Vanadium
Martinez Mine		Private		Uranium
Mary No 1 Mine		Private		Uranium
Mary No.1 Mine		Private	Underground	Uranium
Melrich Group		National Forest		Uranium
Mesa Top		National Forest		Uranium
Mesa Top 7	E. P. Moe	Federal		Uranium
Mesa Top Mine		BLM Administrative Area		Molybdenum Uranium Vanadium

Mine	Owner	Land Status	Work Type	Minerals
Mesa Top Mine	Holly Uranium Co.	Federal		Uranium
Miguel Creek Dome				Iron Thorium Titanium Zirconium
Mine #5	Berryhill, Adrian	Private		Uranium
N.M. Materials Co. Pit & Mill	N. M. Materials Co	Private		Stone, Crushed
Narrow Canyon Deposit				Uranium
Nicholson-Brown Uran Deposit		Federal		Uranium
Nielsons Pit				Sand and Gravel
Nite Group	Kerr - Mcgee	Private		Uranium
No 4 Moe		National Forest		Uranium
No.4 Mine	Ruth Mining And Drilling Co	State		Uranium
Northeast Church Rock Mine		Private	Underground	Uranium
Nose Rock No. 1 Mine	Phillips Uranium Corp.			Molybdenum Uranium
Noserock #2	Phillips Uranium Corp.	State		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Nuclear Power Sec 12	Cobb Nuclear	Private		Uranium
Palo Verde Group		National Forest		Uranium
Phillips Ambrosia Mill	United Nuclear Corp	Private		Uranium
Poison Canyon Mine	Haystack Mtn. Dev. Co.	Private	Surface/Underground	Selenium Uranium Vanadium
Private Property	Fred Glover	Federal		Uranium
Proj. Adap 8-35-0019-01		Unknown		Stone
Prospect 2 Uran Deposit		Unknown		Uranium
Pueblo Alto				Stone
Pure Oil #3				Geothermal
Pure Oil Navajo # 1				Geothermal
Pyramid Group	Andre Senutovich	Unknown		Uranium
Quarry				Stone
R A 1		National Forest		Uranium
Red Cap Group		Private		Uranium
Red Dog Pit	Mendoza Red Dog	Private		Pumice
Red Point Lode Group	R. M. Shaw	State		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Red Rock 3 & 4	Four Corners Expl. Co.	Federal		Uranium
Red Top Mines		BLM Administrative Area		Uranium Vanadium
Redco		Private		Uranium
Ree-Co #1	Ree-Co Energy Inc.	Federal		Uranium
Regina Group		Unknown		Uranium
Rem Mine	Santa Fe Railroad	Federal		Uranium
Rimrock	Four Corners Expl. Co.	Private		Uranium
Rimrock #1		Federal		Uranium
Rimrock #2 Mine		Federal		Uranium
Rock Pit		Private		Stone
Roundy #2 Pit	Elbert L. Roundy	Private		Stone, Crushed
Roundy Mine	Four Corners Expl. Co.	Private		Uranium
Ruby No. 1 and No. 2 Decline	Western Nuclear Inc.			Uranium
Ruby No. 3 and No. 4 Decline			Underground	Uranium
Saint Jude		National Forest		Uranium
San Antone Pit				Limestone

Mine	Owner	Land Status	Work Type	Minerals
San Antone Pit	Elkins Ranch, Inc.	Private		Stone, Crushed
San Antonio No. 1- 8 Placer Claims	Eber C. Newman	Federal		Pumice
San Juan Pit	Mountain States Constructors	Federal		Sand and Gravel
San Mateo Dome				Uranium
Sanches 1		Unknown		Uranium
Sand Pit		Unknown		Sand and Gravel
Sand Pit		Unknown		Sand and Gravel
Sand Pit		Private		Sand and Gravel
Sand Pits		Unknown		Sand and Gravel
Sandstone Mine		Private	Underground	Iron Molybdenum Selenium Uranium Vanadium
Sandstone Quarry				Flagstone
Santa Clara Pumice Pit 2		National Forest		Pumice
Santa Cruz Magnetite		Unknown		Iron

Mine	Owner	Land Status	Work Type	Minerals
Santa Fe Christ		Federal		Uranium
Santa Fe Lease #1 Mine	Foutz Ming. Co.	Federal		Uranium
Section 1 Mine		Private		Uranium
Section 1 Uran Deposit	Phillips Petroleum Co.	Private		Uranium
Section 1 Uran Deposit	Superior Oil Co	Private		Uranium
Section 10 Mine		BLM Administrative Area		Molybdenum Selenium Uranium
Section 10 Mine	Cobb Nuclear Corp.	Federal		Uranium
Section 10 Mine	Kermac Nuclear Fuels Inc.	Federal		Uranium
Section 12 Uran Deposit	Kermac Nuclear Fuels Corp.	Federal		Uranium
Section 13 Mine		Private	Underground	Uranium
Section 13 Mine	United Nuclear-Homestake Partners	Private		Uranium
Section 13 Uran Deposit		Private		Uranium
Section 13 Uran Deposit		Federal		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Section 13 Uran Deposit		Federal		Uranium
Section 13 Uran Deposit	Calumet And Hecla Corp	Private		Uranium
Section 13 Uran Deposit	Homestake Mining Co.	Private		Uranium
Section 13 Uran Deposit	Homestake Mining Co.	Private		Uranium
Section 14 Deposit		Federal		Uranium
Section 14 Mine	Cobb Nuclear Corp.	Private		Uranium
Section 14 Uran Deposit		Federal		Uranium
Section 15 Mine		Private	Underground	Barium Selenium Uranium Vanadium
Section 15 Mine	United Nuclear-Homestake Partners	Private		Uranium
Section 16 Uran Deposit		State		Uranium
Section 16 Uran Deposit	Sabre Pinon Corp.	State		Uranium
Section 16 Uran Deposit		State		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Section 17 Mine		Private	Underground	Barium Molybdenum Uranium
Section 17 Mine	Kerr-Mc Gee Corp.	Private		Uranium
Section 17 Uran Deposit		Federal		Uranium
Section 17 Uran Deposit		Private		Uranium
Section 17 Uran Deposit	Food Machin. And Chem. Corp.	Private		Uranium
Section 18 Mine		Private		Uranium Vanadium
Section 18 Mine		Private		Uranium
Section 18 Ne Uran Deposits		Private		Uranium
Section 18 Uran Deposit		Unknown		Uranium
Section 18 Uran Deposit		Federal		Uranium
Section 18 Uran Deposit		Private		Uranium
Section 18 Uran Deposit		Private		Uranium
Section 19 Mine	United Nuclear Corp.	Private		Uranium
Section 19 Mine	Kerr-Mc Gee Corp.	Private		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Section 19 Mine	Warren-Mccormack	Private		Uranium
Section 19 Uran Deposit		Federal		Uranium
Section 2 Uran Deposit		State		Uranium
Section 2 Uran Deposits	Sabre Pinon Corp.	Private		Uranium
Section 20 Mine		Private		Uranium
Section 20 Uran Deposit		Unknown		Uranium
Section 20 Uran Deposit	Kermac Nuclear Fuels Corp.	Federal		Uranium
Section 20 Uran Deposit	Kermac Nuclear Fuels Corp.	Federal		Uranium
Section 21 Mine	Phillips Petroleum Co.	Private		Uranium
Section 21 Uran Deposit		Federal		Uranium
Section 21 Uran Deposit		Federal		Uranium
Section 21 Uran Deposit	Kermac Nuclear Fuels Corp.	Private		Uranium
Section 22 Mine		Private		Molybdenum Selenium Uranium

Mine	Owner	Land Status	Work Type	Minerals
Section 22 Mine	Kerr-Mc Gee Corp.	Private		Uranium
Section 22 Mine	Hanosh And Mollica	Private		Uranium
Section 22 Uran Deposit		Unknown		Uranium
Section 22 Uran Deposit	Kermac Nuclear Fuels Corp.	Private		Uranium
Section 23 Mine		Private	Underground	Molybdenum Selenium Uranium
Section 23 Mine		Private		Uranium
Section 23 Mine	Haystack Mtn. Dev. Co.	Private		Uranium
Section 23 Uran Deposit		Federal		Uranium
Section 23 Uran Deposit		Private		Uranium
Section 23,26 Mine			Surface	Uranium Vanadium
Section 24 Mine		Private	Underground	Uranium
Section 24 Mine	Kerr-Mc Gee Nuclear Corp.	Private		Uranium
Section 24 Mine	Federal Uran. Co.	Private		Uranium
Section 24 Uran Deposit	Calumet And Hecla Inc.	Private		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Section 24 Uran Deposit		Private		Uranium
Section 24 Uran Deposit		Federal		Uranium
Section 25 Mine		Private	Underground	Uranium
Section 25 Mine	Western Nuclear, Inc.	Federal		Uranium
Section 25 Mine	United Nuclear-Homestake Partners	Private		Uranium
Section 25 Mine	Santa Fe Railroad	Private		Uranium
Section 25 Mine	Santa Fe Railroad	Private		Uranium
Section 25 Mine	United Nuclear	Private		Uranium
Section 25 Mines		Private		Uranium Vanadium
Section 26 Mine				Uranium Vanadium
Section 26 Mine		BLM Administrative Area		Uranium
Section 26 Uran Deposit		Federal		Uranium
Section 26 Uran Deposit	Rio Do Oro Uran. Mines Inc.	Mixed		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Section 26 Uran Deposit		Private		Uranium
Section 27 East	United Nuclear Corp.	Private		Uranium
Section 27 Mine		Private	Underground	Uranium
Section 27 Mine		Unknown		Uranium
Section 27 Uran Deposit	Kermac Nuclear Fuels Corp.	Private		Uranium
Section 27 Uran Deposit		Private		Uranium
Section 27 Uran Deposit		Private		Uranium
Section 28 & 29 Mines	Continental Divide Mining Co.	Federal		Uranium
Section 28 Uran Deposit		Private		Uranium
Section 29	Food Machinery And Chemical Corp.	Private		Uranium
Section 29 Mine		Private		Molybdenum Uranium
Section 29 Uran Deposit		Private		Uranium
Section 3 Uran Deposit		Private		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Section 30 Mine		BLM Administrative Area	Underground	Barium Molybdenum Uranium
Section 30 Mine	Kerr-Mc Gee Nuclear Corp.	Private		Uranium
Section 30 West	Kerr-Mc Gee Nuclear Corp.	Private		Uranium
Section 31 Mine	United Nuclear	Private		Uranium
Section 31 Mine	United Nuclear	Private		Uranium
Section 31 Mine	Phillips Uranium Corp.	Federal		Uranium
Section 31 Uran Deposit		National Forest		Uranium
Section 32 Mine		Private		Molybdenum Uranium
Section 32 Mine	Four Corners Expl. Co.	State		Uranium
Section 32 Mine	United Nuclear - Homestake Partners	State		Uranium
Section 32 Uran Deposit	Four Corners Expl. Co.	State		Uranium
Section 32 Uran Deposit	Four Corners Expl. Co.	State		Uranium
Section 33 Mine		Private	Underground	Molybdenum Uranium
Section 33 Mine	Kerr-Mc Gee Corp.	Private		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Section 33 Mine	United Nuclear Corp	Private		Uranium
Section 34		Private		Uranium
Section 35 Mine	Kerr-Mc Gee Nuclear Corp.	Private		Uranium
Section 35 Mine		Federal		Uranium
Section 35 Uran Deposit		Private		Uranium
Section 36 Mine		State	Underground	Uranium Vanadium
Section 36 Mine	United Nuclear-Homestake Partners	State		Uranium Vanadium
Section 36 Ne	M. Mirabal	State		Uranium
Section 36 Uran Deposit		National Forest		Uranium
Section 36 Uran Deposit	Food Machinery And Chem. Corp.	State		Uranium
Section 4 Uran Deposit		Private		Uranium
Section 4 Uran Deposit		Private		Uranium
Section 5 No. 2 Mine	Westvaco Minerals Products	Private		Uranium
Section 5 Uran Deposit		Private		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Section 6 Uran Deposit		Federal		Uranium
Section 9 Uran Deposit		Federal		Uranium
Sections 12 & 13 Deposit		Mixed		Uranium
Sections 2 & 3 Uran Deposit	Entrada Oil And Copper Co.	Mixed		Uranium
Sections 32 & 33 Mine	Cobb Nuclear Corp.	Private		Uranium
Silver Bit		Unknown		Uranium
Silver Bit #15		Federal		Uranium
Silver Bit #18		Federal		Uranium
Silver Bit #7		Federal		Uranium
Silver Bit Mines		BLM Administrative Area		Uranium Vanadium
Silver Spur Mine		Private		Uranium Vanadium
Silver Spur Mine		Private		Uranium
Small Stake	Febco	Private		Uranium
Spencer Mine	Koppen Mining Construction Co.	Federal		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Spencer Shaft	Kippen Mining Construction Corp.	Unknown		Uranium
Standing Rock				Iron Thorium Titanium Zirconium
Star Lake				Stone
Star Lake				Iron Thorium Titanium Zirconium
State Hwy Pit # 60-58-S		National Forest		Stone, Crushed
State Hwy Pit No 57-35-S		Unknown		Sand and Gravel
State Hwy Pit No 57-39-S		Unknown		Stone, Crushed
State Hwy Pit No 58-98-F		Unknown		Sand and Gravel
State Hwy Pit No. 56-112-S	A. T. And Sante Fe Railroad	Private		Stone, Crushed
State Hwy Pit No. 56-113-S	A. T. And Sante Fe Railroad	Private		Stone, Crushed
State Hwy Pit No. 56-70-S		Unknown		Stone, Crushed
State Hwy Pit No. 57-101-S				Stone, Crushed

Mine	Owner	Land Status	Work Type	Minerals
State Hwy Pit No. 57-109-S	Elkins	Private		Sand and Gravel
State Hwy Pit No. 57-96-S		Unknown		Stone, Crushed
State Hwy Pit No. 58-101-F		Unknown		Sand and Gravel
State Hwy Pit No. 58-66-S				Sand and Gravel
State Hwy Pit No. 62-21-S	Elkins	Private		Stone, Crushed
State Hwy Pit No. 63-7-S				Sand and Gravel
State Hwy Pit No. 65-27-S	A. T. And Sante Fe Railroad	Private		Sand and Gravel Stone, Crushed
State Hwy Pit No. 71-11-S	Turpen	Private		Stone, Crushed
State Hwy Pit No. 71-16-S				Stone, Crushed
State Hwy Pit No. 71-19-S				Sand and Gravel Stone, Crushed
State Hwy Pit No. 77-18-S	A. T. And Sante Fe Railroad	Private		Stone, Crushed
State Hwy Pit No. 78-36-S	Elkins	Private		Stone, Crushed

Mine	Owner	Land Status	Work Type	Minerals
State Hwy Pit No. 78-8-S				Sand and Gravel
State Hwy Pit No. 78-9-S				Sand and Gravel
State Hwy Pit No. 79-11-S	Elkins	Private		Stone, Crushed
State Pit 63-4-5		Unknown		Sand and Gravel
Sundt Pit	Sundt Const. Co.	Private		Stone
T Claim Group	Henry Andrews	Federal		Uranium
Thoreau				Stone, Crushed
Three Jacks Mine	Three Jacks Mining Co	Federal		Uranium
Todilto Mine #2	Todilto Expl. And Dev. Corp.	Mixed		Uranium
Togay Springs		Unknown		Geothermal
Tohatchi Pit				Sand and Gravel
Top of World		Unknown		Stone
Trotz Const. Pit				Stone
Twin Buttes		Private		Stone, Crushed
Twin Buttes Pit	Sam Tomada	Private		Sand and Gravel

Mine	Owner	Land Status	Work Type	Minerals
Twin Buttes Quarry				Stone
U Mine	Frontier Uranium Co	Federal		Uranium
Un Homestake Partners Sec 15 Mine		Private		Uranium
United Nuclear Corp Plant		Private		Uranium
United Nuclear Sec 27 East Mine		Private		Uranium
United Nuclear Uranium Mill (Facility)	United Nuclear Corp.	Private		Uranium
Unnamed		Private		Uranium
Unnamed		Private		Uranium
Unnamed		Private		Uranium
Unnamed		Private		Uranium
Unnamed		Private		Uranium
Unnamed		Unknown		Uranium
Unnamed		Private		Uranium
Unnamed		Private		Uranium
Unnamed		Private		Uranium
Unnamed		Private		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Unnamed Occurrence		BLM Administrative Area		Gypsum-Anhydrite
Upper Nutria Limestone Pit				Stone
Uran Mine		Private		Uranium
Uran Deposit		Private		Uranium
Uran Deposit		Private		Uranium
Uran Deposit		National Forest		Uranium
Uran Deposit		Private		Uranium
Uran Deposit		National Forest		Uranium
Uran Deposit		Federal		Uranium
Uran Deposit		Federal		Uranium
Uran Deposit		Private		Uranium
Uran Deposit		Private		Uranium
Uran Deposit		Private		Uranium
Uran Deposit		Federal		Uranium
Uran Deposit		Private		Uranium
Uran Deposit		Private		Uranium
Uran Mine		Private		Uranium
Uran Mine		Private		Uranium
Uran Mine		Private		Uranium
Uran Mine		Private		Uranium

Mine	Owner	Land Status	Work Type	Minerals
Uran Mine		Private		Uranium
Uran. Mine		Private		Uranium
Uran. Mine		Federal		Uranium
Uran. Prospects	State Of New Mexico	State		Uranium
Uranium Prospects		Mixed		Uranium
Vallejo Mine	Farris Mines	National Forest		Uranium
West Largo Deposit				Uranium
Western Section 21	Western Nuclear, Inc.	Federal		Uranium
Westvaco	Westvaco Chemical Co.	Private		Uranium
Westwater #1	Westwater Corp.	State		Uranium
Westwater No. 1 Mine		State	Surface/Underground	Uranium Vanadium
Williams		Private		Uranium
Williams & Reynolds Mine	Williams And Reynolds	Federal		Uranium
Williams Property	Santa Fe Uran. Co	Unknown		Uranium
Wylie Bros. Pit	Federal Government	Private		Sand and Gravel
Yucca #2 Mine	Yucca Uranium, Inc	Federal		Uranium

Minerals mined in McKinley County: 14 different minerals

- Sand and Gravel
- Uranium
- Barium
- Selenium
- Vanadium
- Molybdenum
- Gypsum-Anhydrite
- Stone, Crushed
- Geothermal
- Iron
- Pumice
- Thorium
- Titanium
- Zirconium

Oil and Gas Companies in McKinley County:

- MERRION OIL & GAS CORP
- SYNERGY OPERATING LLC
- NERDLIHC CO INC
- SG INTERESTS I LTD
- BASIN FUELS LTD
- ENERDYNE, LLC
- FARRIS MINES
- JOSEPH SANCHEZ DBA J&F PRODUCTION
- MOUNTAIN STATES PETROLEUM CORP
- BC & D OPERATING INC.
- DOMINION PRODUCTION COMPANY, LLC
- BASIN FUELS LTD
- R - J ENTERPRISES
- WOOSLEY OIL CO
- ROBERT L BAYLESS
- BC & D OPERATING INC
- NACOGDOCHES OIL AND GAS, INC
- HPOC, LLC

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