



Cumulative Impacts Plan

Archer Field Oil and Gas Development Plan

This Cumulative Impacts Plan has been prepared by Chaco Energy Company (Chaco) for its Archer Field Oil and Gas Development Plan (OGDP) in Cheyenne County, Colorado. Chaco proposes to develop the following four Oil and Gas Locations:

Table 1. Locations

Location	Location ID	Qtr Qtr T12S R44W	Lat/Lon
Champlin 360 Amoco A #4	380504 (Re-entry)	NWSE Sec. 29	38.977390, -102.359945
Pelton 41-31 #1	380356 (Re-entry)	NENE Sec. 31	38.969823, -102.373764
Champlin Tank Pad	New	NWSW Sec. 29	38.977813, -102.369827
Pelton Tank Pad	New	NENE Sec. 31	38.970818, -102.372405

The locations will be on fee surface for production of fee minerals.

Chaco is proposing to re-enter and complete one previously plugged and abandoned conventional vertical well at each well pad location. The primary target is helium gas. Each well will be approximately 5,400 feet deep.

Each well pad will have a new associated tank pad. Separate tank pads are at the request of the surface owners. The Champlin Tank Pad surface owner requested a separate tank pad in order to return to cropland all but the 0.23-acre production pad for the Champlin 360 Amoco A #4 well. The Pelton Tank Pad surface owner requested a separate tank pad in order to locate permanent production equipment adjacent to the existing Tumbleweed Midstream Compressor Station on the surface owner's land.

During production, the well pad will contain only a wellhead. Gas will be transported from each well pad to the associated tank pad using a buried steel off-location flowline. The wells are expected to produce for 20 years.

At each tank pad, gas will be separated using a 3-phase separator. Produced water will be stored in a single enclosed tank for offloading to a commercial disposal well approximately twice per month. Condensate will be stored in a single enclosed tank for offloading to a commercial terminal approximately four times per year. Gas will be piped underground to tie into the existing Ladder Creek Gathering System operated by Tumbleweed Midstream.

The Champlin 360 Amoco A #4 location is on cropland. The other locations are rangeland. All locations are zoned A-Agricultural by Cheyenne County. Oil and gas extraction and pipelines are a *use by right* in the zoning district. After construction, well pads will be 0.23 acres during production. Tank pads will be 0.87 acres (Champlin) and 0.52 acres (Pelton).

Each location is expected to require 2 days to construct. Each well is expected to require 2 days for re-entry with a workover rig and 1 day for completion to case and perforate the well. Interim reclamation is expected to require 1 day during the first growing season and within 3 months on cropland and 6 months on non-cropland. Locations will be inspected daily.

This Plan addresses the Energy & Carbon Management Commission (ECMC) requirement at Rule 304.c.(19) to prepare a Cumulative Impacts Plan documenting how the Operator will address cumulative impacts to resources identified in Rule 303.a.(5). Pursuant to Rule 304.c.(19), the Plan includes:

- A. A description of resources to which cumulative adverse impacts are expected to increase;
- B. A description of measures taken to avoid or minimize the extent to which cumulative impacts are increased;
- C. A description of measures taken to mitigate or offset cumulative impacts; and
- D. Additional information determined to be reasonable and necessary to the evaluation of cumulative impacts.

Resources listed in Rule 303.a.(5) and addressed in this Plan are:

- Air Resources
- Public Health
- Water Resources
- Terrestrial and Aquatic Wildlife Resources & Ecosystems
- Soil Resources
- Public Welfare, including:
 - Noise
 - Light
 - Odor
 - Dust
 - Recreation and Scenic Values

1.0 Air Resources

A. Cumulative Impacts

Development will occur in Cheyenne County. The area is designated attainment for National Ambient Air Quality Standards established by the U.S. Environmental Protection Agency.

Pre-production operations increase the following from non-road internal combustion engines: nitrogen oxides, carbon monoxide, volatile organic compounds, and carbon dioxide.

Production operations increase the following from two storage tanks at each tank pad location: volatile organic compounds and carbon dioxide. Well pads will contain only a wellhead and buried flowline and are not expected to have air emissions.

Emissions from diesel vehicle road miles are shown in Table 2 by location for all phases of development.

Table 2. Diesel Vehicle Road Miles

Location	Construction	Drilling	Completions	Interim Reclamation	Production ¹
Champlin 360 Amoco A #4	976	1,089	500	242	1,000
Pelton 41-31 #1	966	1,079	490	238	1,000
Champlin Tank Pad	962	0	0	236	36,000
Pelton Tank Pad	962	0	0	236	36,000
TOTAL	3,866	2,168	990	952	74,000

¹Life of production

Increased air emissions are quantified on the Form 2B submitted with the application. Adverse cumulative impacts are not anticipated because of the short duration for construction and well re-entry without drilling fluid; tie-in to a gas gathering system; and the enclosed combustion device to control tank vapors during production.

B. Measures to Avoid or Minimize Cumulative Impacts

Chaco will:

- Commit to connecting to a gas gathering system after well re-entry and completion.
- Contain produced water and condensate in enclosed tanks.

- Route tank vapors to an enclosed combustor with a rating of 99 percent destruction efficiency.
- Implement a leak detection and repair (LDAR) program using audio, visual, and olfactory (AVO) monitoring for leak and spill detection.
- Maintain and periodically test tank seals to ensure that they provide the required back pressure and prevent emissions.
- Use automated tank gauges to gauge liquids without opening the thief hatch.
- Comply with conditions of any permits issued by the Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division.
- Schedule the 2-day well pad construction to avoid high-wind warnings issued for Cheyenne County.
- Re-enter conventional vertical wells without using proppant.
- Water the well pad when indicated by loose soils to stabilize the soil and form a crust.
- Place aggregate when needed at the tie in to the county road.
- Minimize vegetation removal and soil disturbance to the area sufficient to site and level the workover rig and equipment.
- Mound the soil stockpile to prevent loose soils.

C. Measures to Mitigate or Offset Cumulative Impacts

Chaco will:

- Reclaim the areas not needed to support production during the first growing season and within 3 months on cropland and 6 months on non-cropland.

D. Additional Measures

See detailed information in the Dust Mitigation, Topsoil Protection, and Interim Reclamation Plans submitted with the Form 2A applications.

2.0 Public Health

A. Cumulative Impacts

The nearest location to a residence is the Champlin 360 Amoco A #4 well pad. It is approximately 4,070 feet away. The other locations range from 4,170 to 7,200 feet from a residence. There are no Disproportionately Impacted Communities affected by the locations.

Each well pad will have a single conventional vertical well re-entry. Well re-entry is expected to need 2 days using freshwater. Well completion is expected to need 1 day using recycled produced water. During production, each well pad will contain only a wellhead and buried flowline. Each tank pad will contain a 3-phase separator, one produced water tank, one condensate tank, and an enclosed combustor with a control rating of approximately 99 percent destruction.

Estimated truck trips are shown in Table 3 by location for all phases of development.

Table 3. Truck Trips

Location	Construction	Drilling	Completions	Interim Reclamation	Production Mo / Yr
Champlin 360 Amoco A #4	50	80	4	16	60 / 720
Pelton 41-31 #1	50	80	4	16	60 / 720

Location	Construction	Drilling	Completions	Interim Reclamation	Production Mo / Yr
Champlin Tank Pad	50	0	0	16	66 / 792
Pelton Tank Pad	50	0	0	16	66 / 792
TOTAL	200	160	8	64	252 / 3,024

Increased air emissions are quantified on the Form 2B submitted with the application. Adverse cumulative impacts are not anticipated because of the short duration for well re-entry without drilling fluid; tie-in to a gas gathering system; the enclosed combustion device to control tank vapors during production; and distances to receptors.

B. Measures to Avoid or Minimize Cumulative Impacts

Chaco will:

- Re-enter wells using freshwater and without drilling fluid.
- Complete wells using recycled produced water stored over 1 day in an enclosed truck tank.
- Commit to connecting to a gas gathering system after well re-entry and completion.
- Contain produced water and condensate in enclosed tanks.
- Route tank vapors to an enclosed combustor with a rating of 99 percent destruction efficiency.
- Implement a leak detection and repair (LDAR) program using audio, visual, and olfactory (AVO) monitoring for leak and spill detection.
- Maintain and periodically test tank seals to ensure that they provide the required back pressure and prevent emissions.
- Use automated tank gauges to gauge liquids without opening the thief hatch.
- Comply with conditions of any permits issued by CDPHE.

C. Measures to Mitigate or Offset Cumulative Impacts

Chaco will:

- Re-enter previous wells that are distanced from receptors, rather than siting new wells.

D. Additional Information

See detailed illustration of the surrounding area on the Cultural Features Maps submitted with the Form 2A applications.

3.0 Water Resources

A. Cumulative Impacts

The nearest location to water in a downgradient direction is the Champlin Tank Pad. It is approximately 1,780 feet away from a water feature that was field verified during a June 2023 environmental field review to be an upland swale lacking an ordinary high water mark. The other locations are greater than 2,640 feet in a downgradient direction from water.

The estimated depth to groundwater is 62 feet. Groundwater depth is based on irrigation well data maintained by the Division of Water Resources.

The volume of groundwater used for well development is an estimated 800 bbl per well re-entry, 1,600 bbl total. Water will be sourced from a municipal groundwater well and trucked to the locations. The municipal groundwater

well is made available by the town of Cheyenne Wells for water haulers. The well is metered by the Public Works Department, which promotes its conservation.

Adverse cumulative impacts are not anticipated because of the distance to water; the depth to groundwater; well re-entry without pits; steel secondary containment around liquids storage; no drill cutting burial; and minimal groundwater needed for re-entry.

B. Measures to Avoid or Minimize Cumulative Impacts

Chaco will:

- Buffer the locations from downgradient surface water by more than 0.5 mile.
- Re-enter conventional vertical wells without drilling fluid, hydraulic fracturing, stimulation, or flowback.
- Capture drips or leaks under the workover rig.
- Operate a workover rig with an integrated fuel tank to avoid a separate fuel tank on the location.
- Store fluids inside of lined steel secondary containment sized to 150 percent of the size of the largest tank. Secondary containment will be visually inspected for evidence of damage, deterioration, or loss of integrity. Repairs will be made promptly to prevent the risk of migration from a leak or spill.
- Install catch basins on loadout piping. Loadout piping will contain bull plugs when not in use.
- Test tanks per manufacturer's specifications prior to putting them into service for production. Periodic integrity testing after initial startup will occur per API or STI standards and manufacturer's recommendations.
- Monitor transfer lines visually at the connection points for stains, drips, or other signs of leakage requiring correction and will be repaired promptly.
- Use stormwater controls to prevent sediment run on and runoff from the location.

C. Measures to Mitigate or Offset Cumulative Impacts

Chaco will:

- Source groundwater from the designated and metered groundwater well made available to water haulers by the Town of Cheyenne Wells, Public Works Department. The controlled and metered use of groundwater will promote its conservation.
- Perform interim reclamation during the first growing season and within 3 months on cropland and 6 months on non-cropland to stabilize disturbed soil.

D. Additional Information

See detailed information in the Fluid Leak Detection Plan, Stormwater Management Plan, Interim Reclamation Plan, and on Hydrology Maps submitted with the Form 2A applications.

4.0 Terrestrial and Aquatic Wildlife Resources & Ecosystems

A. Cumulative Impacts

The locations are in Lesser Prairie Chicken (LPC) Estimated Occupied Range (EOR). LPC EOR is considered High Priority Habitat (HPH) because it was included in Appendix VII mapping under the 1200 Series rules. Chaco conducted pre-application consultation with Colorado Parks & Wildlife (CPW) on July 11, August 25, and November 6, 2023 under Rule 309.e.(2).A. Chaco received a CPW waiver under Rule 304.b.(2).B.viii on the basis that the proposed development is not likely to impact LPC since Chaco is co-locating with existing infrastructure and the location is already impacted by other development so this plan is not adding additional impacts.

The existing impacts are a Tumbleweed Midstream compressor station, Tumbleweed Midstream sales meter, decommissioned Archer Helium Plant, active Champlin 360 Amoco A #1 well, cultivated cropland, Xcel Energy Cheyenne Ridge Wind Project wind turbines, County Road 43, and dirt roads. There are no other species of concern.

Colorado is part of a broad Central Flyway for migratory birds, one of four North America flyways. There is no mapping specific to migratory bird pathways near the locations, according to data provided by the U.S. Fish and Wildlife Service, CPW, and National Audubon Society. There will be no cumulative impacts to migratory bird pathways.

The locations are zoned A-Agricultural by Cheyenne County. Current land use is cropland and disturbed rangeland. Rangeland disturbances are the industrial uses listed above and dirt roads.

During the growing season, crops and area vegetation may provide cover and forage for birds and wildlife. Area vegetation is predominantly blue grama, buffalo grass, cheatgrass, fourwing saltbrush, lambsquarter, quackgrass, soft brome, and sunflower. After harvest, field stubble also may provide seeds for birds and wildlife.

Well and tank pad construction will convert 5.86 acres to oil and gas development.

New access will convert 0.89 acres.

Flowlines will convert 0.13 acres.

The total combined use will be an estimated 6.88 acres.

During interim reclamation, portions of the well pads and tank pads, and both flowline corridors, will be restored. This will reclaim an estimated 4.14 acres of foraging habitat.

Adverse cumulative impacts are not anticipated because cover and foraging habitat for birds and wildlife has occurred from previous disturbance at and surrounding the locations. New construction will be limited to 6.88 acres and downsized to 2.74 acres during production for pads and access roads.

B. Measures to Avoid or Minimize Cumulative Impacts

Chaco will:

- Re-enter previous wells to avoid habitat fragmentation.
- Not have open pits or water that might attract wildlife.
- Keep locations unlit during production.
- Ensure that trenches left open for more than 5 consecutive days during construction of flowlines regulated under the 1100 Series Rules have wildlife escape ramps at a minimum of one ramp per ¼ mile of trench.
- Either conduct vegetation removal outside of the nesting season for migratory birds (April 1 to August 31) or conduct a pre-construction nesting migratory bird survey within the approved disturbance areas prior to vegetation removal during the nesting season.
- Consolidate and centralize fluid collection and distribution facilities to minimize impact to wildlife.
- Install screening or other devices on stacks to prevent entry by migratory birds.

C. Measures to Mitigate or Offset Cumulative Impacts

Chaco will:

- Downsize each location during interim reclamation to less than 1 acre.
- Reclaim the remaining area at each location to pre-construction habitat.

- Reclaim the flowline corridors to return them to pre-construction habitat.
- Till the reclaimed area to re-establish a seedbed. In cooperation with the surface owner, Chaco will identify appropriate soil amendments to promote vegetative growth.
- Identify a perennial cover or a crop in cooperation with the surface owner and Cheyenne County agricultural extension.

D. Additional Information

See detailed information in the Wildlife Protection Plan and Interim Reclamation Plan, and on the Wildlife Habitat Maps submitted with the Form 2A applications.

5.0 Soil Resources

A. Cumulative Impacts

Soils at the locations, flowlines, and access roads are:

19: Keith-Richfield silt loams, 0 to 2 percent slopes

- Champlin 360 Amoco A #4 and flowline
- Champlin Tank Pad
- Champlin access
- Pelton access

20: Keith-Ulysses silt loams, 1 to 4 percent slopes

- Pelton 41-31 #1, flowline, and access

54: Wiley Complex, 0 to 3 percent slopes

- Champlin 360 Amoco A #4

1422 Goshen silt loam, untitled with respect to slopes

- Pelton 41-31 # flowline
- Pelton Tank Pad
- Pelton access

The A horizon for these soil types is silt loams overlaying silt or silty clay loams. The soils are well drained.

The locations will disturb the combined acreages shown in Table 4.

Table 4. Soil Disturbance Area

Location	Oil and Gas Location (ac)	New Access Road (ac)	Flowline (ac)	Total Disturbance (ac)	Total Reclamation (ac)
Champlin 360 Amoco A #4	2.07	0.85	0.12	3.04	1.96
Pelton 41-31 #1	2.07	0.01	0.01	2.09	1.85
Champlin Tank Pad	1.06	NA	NA	1.06	0.19
Pelton Tank Pad	0.66	0.03	NA	0.69	0.14
TOTAL	5.86	0.89	0.13	6.88	4.14

Adverse cumulative impacts are not anticipated because the total disturbance after interim reclamation is an estimated 2.74 acres and less than 1 acre per pad. Final reclamation will be conducted in accordance with ECOM

requirements by plugging and abandoning wells, removing equipment and surfacing material, and restoring the locations to specifications from ECMC and the landowners.

B. Measures to Avoid or Minimize Cumulative Impacts

Chaco will:

- Bury the flowlines in trenches approximately 2 feet wide to minimize soil disturbance.
- Segregate soil removed during flowline trenching based on changes in physical characteristics. The soil layers will be windrowed adjacent to the trench.
- Protect soil from compaction on the locations by designating it with surveyor staking and flagging as topsoil for reclamation.
- Protect the topsoil stockpile from wind degradation by mounding to prevent loose soils.
- Protect the topsoil stockpile from erosion by ensuring that stormwater controls and diversions are installed, where needed, to divert stormwater away from the stockpile.
- Allow vegetation to establish on the topsoil stockpile to stabilize it, outcompete weeds, and promote soil microbial activity.
- Install erosion controls to prevent stormwater runoff from the locations.

C. Measures to Mitigate or Offset Cumulative Impacts

Chaco will:

- Replace soils from the flowline trench promptly in the order in which they were removed.
- Salvage and preserve topsoil on the locations based on the results of soil test pits for texture, color, structure, consistency, and organic matter.
- Conduct interim reclamation during the first growing season and within 3 months on cropland and 6 months on non-cropland.

D. Additional Information

See detailed information in the Topsoil Protection Plan, Stormwater Management Plan, and Interim Reclamation Plan submitted with the Form 2A applications.

6.0 Public Welfare

A. Cumulative Impacts

Noise

Construction will be an estimated 2 days at each location. Well re-entry will be an estimated 2 days at each well location. Completion will be an estimated 1 day at each well location. The nearest location to a residence is the Champlin 360 Amoco A #4 well pad. It is approximately 4,070 feet away. The other locations range from 4,170 to 7,200 feet from a residence.

The area does not support HPH or habitat mapped for species of concern. The area is historically disturbed from agricultural operations, dirt roads, and industrial activity that includes a former helium plant, compressor station, oil and gas infrastructure, and wind turbines.

During production, well pads will contain only a wellhead and buried flowline. Tank pads will contain a 3-phase separator, tanks inside of secondary containment, and an enclosed combustor. Inspections will occur daily using a light-duty pickup truck. Produced water offloading will occur approximately twice per month. Condensate offloading will occur approximately four times per year.

Adverse cumulative impacts are not anticipated because of the short durations for construction and well re-entry, limited truck trips during production, distance to receptors, finding that development is not likely to impact LPC, and lack of other species of concern.

Light

Lighting during well re-entry and completion will be limited to lights mounted on the workover rig that are cast downward to illuminate the operation. Locations will be unlit during production. Adverse cumulative impacts are not anticipated because of the short duration for well re-entry; unlit facilities during production, distance to receptors, finding that habitat is not likely to impact LPC, and lack of other species of concern.

Odor

Well re-entry will use freshwater. One day for completion at each well location will use produced water contained in an enclosed truck tank. During production, the locations will operate with vapor recovery controls and using enclosed combustors with a manufacturer control rating of 99 percent destruction efficiency. The nearest residence is approximately 4,070 feet away. Adverse cumulative impacts are not anticipated because of the controls in place and lack of receptors.

Dust

Each location will disturb approximately 2 acres of land, or less. After interim reclamation, all locations will be less than 1 acre. Reclaimed areas and flowline corridors will be revegetated. Wells will be re-entered without proppant. Adverse cumulative impacts will be controlled using the best management practices (BMPs) listed below and in the operator's Dust, Topsoil, and Interim Reclamation Plans. The BMPs address limiting disturbance areas, controlling vehicle speeds, road maintenance, topsoil stockpile stabilization, and reclamation.

Recreation and Scenic Values

The locations are in a remote area in Cheyenne County on private surface not accessible to the public. There will be no adverse cumulative impacts to recreation and scenic values because the locations have no nearby public recreation and do not contrast with existing land uses. Surrounding land uses include a former helium plant, compressor station, oil and gas infrastructure, and wind turbines. For vehicles passing by, the small size and nature of the operations is consistent with other land uses. There are no nearby state parks, state wildlife areas, trust lands, designated outdoor activity areas, or mapped trails.

B. Measures to Avoid or Minimize Cumulative Impacts

Chaco will:

- Maintain equipment and vehicles in proper working condition to minimize noise.
- Cast lights downward on the operations during well re-entry and completion.
- Schedule 2-day location construction to avoid high-wind warnings issued for Cheyenne County.
- Water the pads when indicated by loose soils to stabilize the soil and form a crust.
- Place aggregate when needed at the tie in to the county road.
- Minimize vegetation removal and soil disturbance to the area sufficient to site and level the workover rig and equipment.
- Mound soil stockpiles to prevent loose soils.

C. Measures to Mitigate or Offset Cumulative Impacts

Chaco will:

- Comply with the noise levels specified in Rule 423.b.(1).

- Reduce truck traffic by using, in part, a gas pipeline for takeaway capacity.
- Paint tanks a desert tan (or similar) to blend with the surrounding landscape.
- Reclaim areas not needed to support production during the first growing season and within 3 months on cropland and 6 months on non-cropland.

D. Additional Information

See detailed information in the Dust Control Plan, Topsoil Protection Plan, and Interim Reclamation Plan submitted with the Form 2A applications.