

APPENDIX N:

**POTENTIAL FOSSIL YIELD CLASSIFICATIONS (PFYC) FOR
GEOLOGIC FORMATIONS INTERSECTING PROPOSED CORRIDORS UNDER
THE PROPOSED ACTION BY STATE**

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APPENDIX N:**POTENTIAL FOSSIL YIELD CLASSIFICATIONS (PFYC) FOR
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THE PROPOSED ACTION BY STATE**

Tables N-1¹ through N-11 of this appendix summarize the PFYC classes and general locations of geologic units intersecting the proposed corridors under the Proposed Action as identified on state geologic maps (usually at the 1:500,000 scale). The PFYC classes (1 through 5) are discussed in Section 3.4 and defined in Table 3.4-2. For this analysis, all Quaternary sediments, summarized in

Table N-12, were given a PFYC Class 3 designation because they are of unknown fossil yield potential. Due to the variability in source material for these sediments, the actual determination of fossil yield potential would be made on the basis of more detailed information (maps and literature) and field surveys during a project-specific assessment.

¹ Shaded text indicates portions of the document that underwent revision between the draft and the final PEIS in response to comments received during the public comment period as well as additional information provided by local federal land managers and resource specialists.

TABLE N-1 PFYC Classes by Formation for Corridors and Corridor Segments under the Proposed Action, Arizona^a

Formation/Rock Type	Age	Class	General Location
Basaltic lava flows	Pliocene to Middle Miocene	1	Colorado Plateau (near northern border); Sonoran Basin and Range (southwest)
Bright Angel Shale	Cambrian	2	Central Mountains (north of Phoenix)
Chinle Formation	Upper Triassic	5	Colorado Plateau (near northern border)
Coconino Sandstone	Permian	3	Colorado Plateau (near northern border)
Conglomerate, Sandstone and Limestone	Pliocene to Oligocene	3	Sonoran Basin and Range (southwest of Tucson); Central Mountains (north of Phoenix)
Glen Canyon Group	Jurassic	5	Colorado Plateau (near northern border)
Granitic rocks	Paleocene to Jurassic	1	Sonoran Basin and Range (southwest)
Granitic rocks	Proterozoic	1	Mojave Basin and Range (northwest); Sonoran Basin and Range (southwest)
Hermit Shale	Permian to Pennsylvanian	2	Colorado Plateau (near northern border); Central Mountains (north of Phoenix)
Kaibab Formation	Permian	3	Colorado Plateau (near northern border)
Kayenta Formation	Lower Jurassic	5	Colorado Plateau (near northern border)
Moenkopi Formation	Middle to Lower Triassic	3	Colorado Plateau (near northern border)
Metamorphic rocks	Cretaceous to Jurassic	1	Sonoran Basin and Range (southwest)
Metamorphic rocks	Proterozoic	1	Mojave Basin and Range (northwest); Sonoran Basin and Range (southwest); Central Mountains (north of Phoenix)
Moenave Formation	Lower Jurassic	5	Colorado Plateau (near northern border)
Morrison Formation	Upper Jurassic	5	Colorado Plateau (near northern border)
Muav Limestone	Cambrian	2	Central Mountains (north of Phoenix)
Navajo Sandstone	Upper Jurassic	5	Colorado Plateau (near northern border)
Redwall Limestone	Mississippian	2	Central Mountains (north of Phoenix)
San Rafael Group	Upper to Middle Jurassic	5	Colorado Plateau (near northern border)
Supai Group	Permian to Pennsylvanian	2	Colorado Plateau (near northern border); Central Mountains (north of Phoenix)
Tapeats Sandstone	Cambrian	2	Central Mountains (north of Phoenix)
Temple Butte Formation	Devonian	2	Central Mountains (north of Phoenix)
Toroweap Formation	Permian	3	Colorado Plateau (near northern border)

TABLE N-1 (Cont.)

Formation/Rock Type	Age	Class	General Location
Volcanic rocks	Middle Miocene to Oligocene	1	Mojave Basin and Range (northwest); Sonoran Basin and Range (southwest); south of Tucson
Wingate Sandstone	Lower Jurassic	5	Colorado Plateau (near northern border)

^a Designations based on geologic map by Kamilli and Richard (1998) and information in Nations and Stump (1996).

TABLE N-2 PFYC Classes by Formation for Corridors and Corridor Segments under the Proposed Action, California^a

Rock Types ^b	Age	Class	General Location
Conglomerate, shale, sandstone, limestone, dolomite, marble, gneiss, hornfels, quartzite	Precambrian	1	Southern California Mountains (northeast of Los Angeles)
Franciscan Complex	Cretaceous and Jurassic	1, 3	Cascade Mountains
Gabbroic rocks	Triassic-Jurassic	1	Cascade Mountains; Sierra Nevada Range; Mojave Basin and Range; Southern California Mountains (northeast of Los Angeles)
Granitic rocks	Cretaceous	1	Cascade Mountains; Sierra Nevada Range
Metasedimentary and metavolcanics	Permian	1	Cascade Mountains
Metasedimentary and metavolcanics	Devonian	1	Cascade Mountains; Sierra Nevada Range
Sandstone, shale, conglomerate	Pleistocene and Pliocene	3	Sierra Nevada Range; Mojave Basin and Range; Southern California Mountains (northeast of Los Angeles); and Sonoran Basin and Range (east of San Diego)
Sandstone, shale, conglomerate	Oligocene	3	Cascade Mountains
Sandstone, shale, conglomerate	Upper and Lower Cretaceous	3	Cascade Mountains
Sandstone, shale, limestone, dolomite, chert, quartzite, and phyllite	Cambrian	1	Southern California Mountains (northeast of Los Angeles)
Ultramafic rocks (intrusives)	Cretaceous to Jurassic	1	Cascade Mountains
Volcanics and metavolcanics	Cretaceous	1	Sierra Nevada Range; Southern California Mountains (northeast of Los Angeles)
Volcanics and metavolcanics	Devonian	1	Cascade Mountains; Mojave Basin and Range
Volcanic flow rocks	Holocene	1	Cascade Mountains; Mojave Basin and Range
Volcanic flow rocks	Oligocene	1	Cascade Mountains; Sierra Nevada Range; Central Basin and Range; Mojave Basin and Range; Southern California Mountains (northeast of Los Angeles)

^a Designations based on the geologic map by Jennings et al. (1977).

^b Rock units were not identified at the formation level on the Jennings et al. (1977) map; therefore, only rock types and their ages are provided. Classifications of sedimentary units (e.g., sandstone, shale, and limestone) should be considered tentative.

TABLE N-3 PFYC Classes by Formation for Corridors and Corridor Segments under the Proposed Action, Colorado^a

Formation/Rock Type	Age	Class	General Location
Beldon Formation	Pennsylvanian	2	West of Colorado Springs
Browns Park Formation	Upper to Middle Miocene	5	Uinta Mountains; Sand Wash Basin
Dakota Sandstone or Group	Cretaceous	5	Middle Park Basin; San Juan Mountains
Dolores Formation	Triassic	3	San Juan Mountains
Fort Union Formation	Paleocene	3	Sand Wash Basin
Granitic rocks	Proterozoic	1	Middle Park Basin; west of Colorado Springs
<i>Green River Formation</i>	Middle to Lower Eocene	5	Piceance Basin; Middle Park Basin
Anvil Points Member			
Douglas Creek Member			
Garden Gulch Member			
Parachute Creek Member			
Igneous Intrusives			
<i>Iles Formation</i>	Tertiary	1	San Juan Mountains
Trout Creek Sandstone Member	Upper Cretaceous	5	Piceance Basin
Lodore Formation			
Madison Formation	Mississippian to Cambrian	2	Uinta Mountains
<i>Mancos Shale</i>	Mississippian to Upper Devonian	3	Uinta Mountains
Juan Lopez Member	Lower Cretaceous	2	Piceance Basin; San Juan Mountains
Mesaverde Formation or Group	Upper Cretaceous	5	Piceance Basin; San Juan Mountains
Metamorphic rocks	Proterozoic	1	Middle Park Basin; west of Colorado Springs
Middle Park Formation	Paleocene	3	Middle Park Basin; west of Colorado Springs
Minturn Formation	Pennsylvanian	2	West of Colorado Springs
Morgan Formation	Pennsylvanian	2	Uinta Mountains
Morrison Formation	Upper Jurassic	5	Middle Park Basin; San Juan Mountains
Ohio Creek Formation	Upper Cretaceous	3	Piceance Basin
Sego Sandstone	Upper Cretaceous	3	Piceance Basin
Troublesome Formation	Miocene	3	Middle Park Basin
Uinta Formation	Eocene	5	Piceance Basin
Wasatch Formation	Lower Eocene	5	Sand Wash Basin; Piceance Basin
Williams Fork Formation	Upper Cretaceous	5	Piceance Basin

^a Designations based on geologic map by Tweto (1979) and information in Table F-1 (of Appendix F) in BLM (2005).

TABLE N-4 PFYC Classes by Formation for Corridors and Corridor Segments under the Proposed Action, Idaho^a

Formation/Rock Type	Age	Class	General Location
Amsden Formation	Pennsylvanian to Upper Mississippian	3	South ^b
Aspen Shale or Formation	Lower Cretaceous	3	Snake River Plain (west)
Basalt Flows and associated tuffs	Lower Pleistocene to Pliocene	1	South
Bear River Formation	Lower Cretaceous	3	Snake River Plain (west)
Frontier Formation	Upper Cretaceous	3	Snake River Plain (west)
<i>Gannet Group</i>	Lower Cretaceous	3	Snake River Plain (west)
Smoot Formation			
Drainey Limestone			
Bechler Shale			
Peterson Limestone			
Fehraim Conglomerate			
Great Blue Limestone	Mississippian	2	South
Idaho Group	Pliocene	3	Snake River Plain (west and east)
Igneous Intrusive rocks (Idaho Batholith)	Lower Cretaceous	1	Snake River Plain (west)
<i>Madison Group</i>			
Deep Creek Formation	Mississippian to Upper Devonian	3	South
Lodgepole Limestone			
Manning Canyon Shale	Mississippian	2	South
Park City Formation	Lower Permian to Lower Pennsylvanian	2	South
Preuss Sandstone or Formation	Upper to Middle Jurassic	3	South
Silicic flows and associated tuffs	Pliocene, Miocene	1, 2	Snake River Plain (west); south
Stream and lake deposits	Pliocene	3	Snake River Plain (west); south
Metasediments: siltite, argillite, and quartzite	Precambrian	1	North (north of St. Joe River)
Wayan Formation	Lower Cretaceous	3	Snake River Plain (west)
Welded tuff	Pliocene, Miocene	2	South
<i>Wells Formation</i>	Permian to Pennsylvanian	2	South
Grandeur Tongue			
Tensleep Sandstone			

^a Designations based on geologic map by Bond and Wood (1978).

^b South refers to the Northern and Central Basin and Range areas to the south of the Snake River Plain.

TABLE N-5 PFYC Classes by Formation for Corridors and Corridor Segments under the Proposed Action, Montana^a

Formation/Rock Type	Age	Class	General Location
Argillites, quartzite, and limestone	Proterozoic	2	Northwest
Basin Fill	Pliocene to Oligocene	3	West, near I-90
Beaverhead Conglomerate	Paleocene	3	West, near I-90
Belle Fourche Shale	Upper Cretaceous	3	South, along I-15; north, along I-15
Big Snowy Group	Mississippian through Upper Devonian	2	South, along I-15
Boulder Batholith	Cretaceous	1	South, along I-15; west, near I-90
Colorado Shale	Cretaceous	3	North, along I-15
Flathead Sandstone	Middle Cambrian	2	South, along I-15; west, near I-90
Fort Union Formation	Paleocene	3	Powder River Basin; Bighorn Basin
Jefferson Limestone	Devonian	2	South, along I-15; west, near I-90
Madison Limestone	Mississippian through Upper Devonian	3	South, along I-15
Metamorphic rocks	Archean (Basement Complex)	1	South, along I-15
Mowry Shale	Lower Cretaceous	3	South, along I-15; north, along I-15
Morrison Formation	Upper Jurassic	5	Northwest
Niobrara Formation	Upper Cretaceous	5	South, along I-15; north, along I-15
Meagher Limestone	Middle Cambrian	2	South, along I-15; west, near I-90
Park Shale	Middle Cambrian	2	South, along I-15; west, near I-90
Pilgrim Limestone	Cambrian	2	South, along I-15; west, near I-90
Prichard Formation	Proterozoic	1	North, along I-15
Quadrant Formation	Pennsylvanian	2	South, along I-15
Ravalli Formation	Proterozoic	1	North, along I-15
Spokane Shale	Cambrian	2	North, along I-15
Thermopolis Shale	Lower Cretaceous	3	South, along I-15; north, along I-15
Three Forks Formation	Upper Devonian	2	South, along I-15; west, near I-90
Two Medicine Formation	Cretaceous	2	North, along I-15
Wallace Formation	Proterozoic	1	Northwest
Willow Creek Formation	Paleocene to Upper Cretaceous	3	Powder River Basin; Bighorn Basin; south, along I-15
Wolsey Shale	Middle Cambrian	2	South, along I-15; west, near I-90
Volcanic rocks	Tertiary	1	North, along I-15; west, near I-90
Volcanic rocks	Cretaceous	1	North, along I-15; west, near I-90

^a Designations based on geologic map by Ross et al. (1955).

TABLE N-6 PFYC Classes by Formation for Corridors and Corridor Segments under the Proposed Action, Nevada^a

Formation/Rock Type	Age	Class	General Location
Andesite and basalt flows	Upper Miocene to Lower Miocene	1	South, west of McCollough Range; southeast of Las Vegas; southwest border, along I-95; east of Reno
Andesite flows and breccias	Upper Miocene to Lower Miocene	1	Southwest border, along I-95; east of Reno; northeast corner of Nevada
Basalt flows	Holocene to Upper Miocene	1	Southwest border, along I-95; north of Reno; north-south line
Basalt flows	Upper Miocene to Lower Miocene	1	Northeast of Las Vegas; north of Reno
<i>Dolomite and limestone</i>	Devonian	2	Las Vegas Valley; northeast corner of Nevada
Sevy Dolomite			
Simonson Dolomite			
Guilmette Formation			
Nevada Formation			
Devils Gate Limestone			
Dolomite and limestone	Cambrian and Ordovician	2	South, crossing Pahrump Valley; northeast of Las Vegas
<i>Dolomite and limestone</i>	Upper and Middle Cambrian	2	Las Vegas Valley
Carrara Formation			
Bonanza King Formation			
Nopah Formation			
Granitic rocks	Cretaceous	1	Southwest border, along I-95; north of Reno; northeast corner of Nevada
Havallah Sequence	Permian to Mississippian	2	East-west line
<i>Limestone and sparse dolomite, siltstone, and sandstone</i>	Lower Pennsylvanian to Lower Permian	2	South, crossing Pahrump Valley; north-south line
Bird Spring Formation			
Callville Limestone			
Limestone and dolomite	Upper and Middle Cambrian	2	North-south line
Intrusive rocks of mafic and intermediate composition	Upper Miocene to Middle Oligocene	1	East of Reno
Metamorphic rocks (gneiss and schist)	Precambrian	1	South, west of McCollough Range; southeast of Las Vegas
Phyllitic siltstone, quartzite, and lesser amounts of limestone and dolomite	Lower Cambrian to Precambrian	1	Southwest border, along I-95
Rhyolites	Upper Miocene to Middle Oligocene	1	East of Reno; east-west line; north-south line

TABLE N-6 (Cont.)

Formation/Rock Type	Age	Class	General Location
Rhyolitic flows and shallow intrusive rocks	Upper Miocene to Lower Miocene	1	Southeast of Las Vegas; southwest border, along I-95
Shale, chert, and minor amounts of quartzite, greenstone, and limestone	Ordovician	1	East-west line
Shale, siltstone, sandstone, conglomerate, and limestone	Mississippian to Devonian	2	East-west line
Tuffaceous sedimentary rocks	Upper Miocene to Lower Miocene	2	Southeast of Las Vegas; northeast of Las Vegas; southwest border, along I-95; east of Reno; east-west line; northeast corner of Nevada
Welded and unwelded tuffs, silicic ash flow tuffs	Upper Miocene to Middle Oligocene	2	Southwest border, along I-95; northeast corner of Nevada; north-south line

^a Designations based on geologic map by Stewart and Carlson (1978).

TABLE N-7 PFYC Classes by Formation for Corridors and Corridor Segments under the Proposed Action, New Mexico^a

Formation/Rock Type	Age	Class	General Location
Animas Formation	Paleocene to Upper Cretaceous	3	Northwest, south/southwest of San Juan Basin
<i>Artesia Group</i>	Permian	5	Southeast, along Mescalero Ridge
Tansil Formation			
Yates Formation			
Seven Rivers Formation			
Queen Formation			
Grayburg Formation			
Moenkopi (locally)			
Basaltic and andesitic lava flow	Middle to Lower Pleistocene	1	Southwest, along I-10
Cliff House Sandstone	Upper Cretaceous	5	Northwest, south/southwest of San Juan Basin
Kirtland and Fruitland Formations	Upper Cretaceous	5	Northwest, south/southwest of San Juan Basin
Lewis Shale	Upper Cretaceous	5	Northwest, south/southwest of San Juan Basin
<i>Lower Santa Fe Group</i>	Upper Miocene to Upper Oligocene	5	Southwest, along I-25 and Rio Grand River
Hayner Formation			
Ranch Formation			
Rincon Valley Formation			
Popotosa Formation			
Cochiti Formation			
Tesuque Formation			
Chamita Formation			
Abiquiu Formation			
Zia Formation			
Mancos Shale	Upper Cretaceous	3	Northwest, south/southwest of San Juan Basin
Menefee Formation	Upper Cretaceous	5	Northwest, south/southwest of San Juan Basin
Nacimiento Formation	Paleocene	5	Northwest, south/southwest of San Juan Basin
Ojo Alamo Formation	Paleocene	5	Northwest, south/southwest of San Juan Basin
Ogallala Formation	Lower Pliocene to Middle Miocene	5	Southeast, along Mescalero Ridge
Pictured Cliffs Formation	Upper Cretaceous	5	Northwest, south/southwest of San Juan Basin
Point Lookout Sandstone	Upper Cretaceous	5	Northwest, south/southwest of San Juan Basin
San Andres Formation	Permian	5	Southeast, along Mescalero Ridge

TABLE N-7 (Cont.)

Formation/Rock Type	Age	Class	General Location
<i>Upper Santa Fe Group</i>	Middle Pleistocene to Upper Miocene	5	Southwest, along I-10; southwest, along I-25 and Rio Grande River
Camp Rice Formation			
Fort Hancock Formation			
Palomas Formation			
Sierra Ladrones Formation			
Arroyo Formation			
Ojito Formation			
Ancha Formation			
Puye Formation			
Alamosa Formation			

^a Designations based on geologic map by Scholle (2003) and information in Lucas and Williamson (1993), Berman (1993), and Williamson and Lucas (1993).

TABLE N-8 PFYC Classes by Formation for Corridors and Corridor Segments under the Proposed Action, Oregon^a

Formation/Rock Type	Age	Class	General Location
Andesite	Holocene and Pleistocene	1	Southeast of Portland
Basalt	Pleistocene and Pliocene	1	Southeast corner of Oregon; central east-west line; central north-south line
Basalt	Upper and Middle Miocene	1	Southwest of Catlow Valley; southeast corner of Oregon; central east-west line; central north-south line
Basalt and andesite	Miocene	1	Southwest of Catlow Valley; eastern border, just west of Snake River; southeast corner of Oregon; central east-west line; central north-south line
Basaltic andesite and basalt	Holocene and Pleistocene	1	Southeast of Portland
Basaltic and andesitic ejecta	Tertiary	1	Southwest of Catlow Valley; central north-south line
Basalt and basaltic andesite	Holocene and Pleistocene	1	Southeast corner of Oregon; central east-west line; central north-south line
Basalt and basaltic andesite	Pliocene and Upper Miocene	1	Southeast of Portland
Basaltic lava flows	Miocene	1	Southeast of Salem; South of Medford
Clastic sedimentary rocks	Upper and Lower Cretaceous	3	South of Medford
Columbia River basalt group and related flows	Miocene	1	Northwest of Portland; southwest of Portland; southeast of Portland; southeast of Salem; eastern border, just west of Snake River; central north-south line
Dothan Formation	Lower Cretaceous and Upper Jurassic	2	South of Medford
Gabbroic rocks	Triassic and Permian	1	Eastern border, just west of Snake River
Granitic rocks	Cretaceous and Jurassic	1	North of Medford; south of Medford
Lacustrine and fluvial deposits	Miocene	3	Central east-west line
Mafic and intermediate intrusives	Miocene	1	Central east-west line
Mafic and intermediate vent rocks	Pliocene and Miocene	1	Southwest of Catlow Valley; eastern border, just west of Snake River; south of Medford; southeast corner of Oregon; central east-west line; central north-south line
Mafic vent deposits	Pleistocene, Pliocene, Miocene	1	Southeast corner of Oregon; central north-south line
Marine sedimentary and tuffaceous rocks	Middle Miocene to Upper Eocene	2	Northwest of Portland
Marine sedimentary rocks	Lower Miocene and Oligocene	3	Southeast of Salem
May Creek Schist	Paleozoic	1	South of Medford

TABLE N-8 (Cont.)

Formation/Rock Type	Age	Class	General Location
<i>Myrtle Group</i>	Lower Cretaceous and Upper Jurassic	3	South of Medford
Riddle Formation			
Days Creek Formation	Eocene	3	South of Medford; north of Medford
Nonmarine sedimentary rocks	Pliocene and Miocene	1	Southwest of Catlow Valley; eastern border, just west of Snake River; central east-west line; central north-south line
Olivine basalt			
Pyroclastic rocks	Holocene, Pleistocene, Pliocene, Miocene	1	Southeast corner of Oregon; central east-west line; central north-south line
Rhyolite and dacite	Pliocene and Miocene	1	Southeast corner of Oregon; central east-west line; central north-south line
Rhyolite and dacite domes and flows with small intrusive bodies	Miocene to Upper Eocene	1	Southeast corner of Oregon; central east-west line; central north-south line
<i>Sedimentary rocks</i>	Pleistocene and Pliocene	2	Central north-south line
Walters Hill Formation			
Springwater Formation			
Sedimentary rocks	Jurassic	2	South of Medford
Sedimentary rocks, partly metamorphosed	Triassic and Paleozoic	2	Eastern border, just west of Snake River
Sedimentary and volcanic rocks	Jurassic and Upper Triassic	1	Eastern border, just west of Snake River
Silicic ash-flow tuff	Lower Pliocene and Upper Miocene	2	Eastern border, just west of Snake River; southeast corner of Oregon; central east-west line; central north-south line
Silicic vent rocks	Pliocene, Miocene, Oligocene, and Eocene	1	Central north-south line
Subaqueous pyroclastic rocks of basaltic cinder cones	Tertiary	1	Central north-south line
Tuffs and basalt	Miocene and Oligocene	2	Southeast of Salem
Tuffaceous sedimentary rocks and tuff	Pliocene and Miocene	2	Southwest of Catlow Valley; northern border; eastern border, just west of Snake River; southeast corner of Oregon; central east-west line; central north-south line
Tuffaceous sedimentary rocks, tuffs, pumicites, and silicic flows	Miocene	2	Southwest of Catlow Valley; southeast corner of Oregon; central east-west line; central north-south line
Ultramafic and related rocks of ophiolite sequences	Jurassic	1	South of Medford

TABLE N-8 (Cont.)

Formation/Rock Type	Age	Class	General Location
Undifferentiated flows and clastic rocks	Miocene	1	Southeast of Portland
Undifferentiated tuffaceous sedimentary rocks, tuffs, and basalt	Miocene and Oligocene	2	South of Medford
Volcanic rocks	Triassic and Permian	1	Eastern border, just west of Snake River
Volcanic rocks	Jurassic	1	South of Medford
Volcanic and metavolcanic rocks	Upper Triassic	1	South of Medford
Wanapum Basalt	Middle Miocene	1	Northern border; eastern border, just west of Snake River
Welded tuffs and tuffaceous sedimentary rocks	Upper and Middle Miocene	2	Southeast corner of Oregon

^a Designations based on geologic map by Walker and MacLeod (1991).

TABLE N-9 PFYC Classes by Formation for Corridors and Corridor Segments under the Proposed Action, Utah^a

Formation/Rock Type	Age	Class	General Location
Basalt and rhyolite	Pliocene	1	Southwest
Bishop Conglomerate	Oligocene	3	Uinta Basin
Bluff Sandstone	Jurassic	3	Southeast
Browns Park Formation	Pliocene to Miocene	3	Uinta Mountains
Burro Canyon Formation	Lower Cretaceous	3	Southeast
Callville Limestone	Pennsylvanian	2	Southwest
Carmel Formation	Jurassic	3	Southeast; southwest
Cedar Mountain Formation	Lower Cretaceous	5	Southeast
Claron Formation	Paleocene	5	Southwest
Coconino Sandstone	Permian	3	Southwest
Currant Creek Formation	Paleocene	5	Uinta Basin
Curtis Formation	Lower Jurassic	3	Southeast
Dakota Sandstone	Lower Cretaceous	3	Southeast
Deseret Limestone	Mississippian	2	North of Salt Lake City
Duchesne River Formation	Oligocene to Eocene	5	Uinta Basin
Entrada Sandstone	Jurassic	3	Southeast; southwest
Farmington Canyon Schist and Gneiss	Archean	1	North of Salt Lake City
Flagstaff (Limestone) Formation	Paleocene	5	Southeast; Uinta Basin
<i>Glen Canyon Group</i>	Lower Jurassic to Upper Triassic	5	Southeast
Navajo Sandstone			
Kayenta Formation			
Wingate Sandstone			
<i>Green River Formation</i>			
Evacuation Creek Member	Eocene	5	Uinta Basin
Parachute Creek Member			
Garden Gulch Member			
Douglas Creek Member			
Humbug Formation	Mississippian	2	North of Salt Lake City
Kaibab Limestone	Upper Permian	3	Southwest
Kayenta Formation	Triassic	5	Southeast; southwest
Little Willow Schist and Gneiss	Archean	1	North of Salt Lake City

TABLE N-9 (Cont.)

Formation/Rock Type	Age	Class	General Location
<i>Mancos Shale</i>	Lower Cretaceous	3	Southeast; Uinta Mountains; Uinta Basin
Masuk Shale Member			
Emery Sandstone Member			
Blue Gate Shale Member			
Ferron Sandstone Member			
Tununk Shale Member			
<i>Mesaverde Group</i>	Upper Cretaceous	3	Southeast; Uinta Basin
Price River Formation			
Castlegate Sandstone			
Blackhawk Formation (coal)			
Start Point Sandstone			
Moenave Formation	Triassic	5	Southwest
Moenkopi Formation	Lower Triassic	3	Southwest
<i>Morrison Formation</i>	Upper Jurassic	5	Southeast
Brushy Basin Member			
Salt Wash Member			
Muddy Creek Formation	Miocene	3	Southwest
Navajo Sandstone	Lower Jurassic to Upper Triassic	3	Southeast; southwest
North Horn Formation	Paleocene	5	Uinta Basin
Nugget (Navajo) Formation	Lower Jurassic to Upper Triassic	3	Uinta Mountains; Uinta Basin
Oquirrh Group	Permian to Upper Pennsylvanian	2	Great Salt Lake Desert (Cedar Mountains)
Pakoon Formation	Permian	2	Southwest
Rhyolites	Tertiary	1	Southwest
Salt Lake Formation	Miocene to Pliocene	3	Central
Summerville Formation	Jurassic	5	Southeast
Supai Group	Permian	2	Southwest
Toroweap Formation	Permian	3	Southwest
Uinta Mountain Group	Proterozoic	1	Uinta Mountains
Uinta Formation	Eocene	5	Uinta Basin; central
Volcanic rocks (undivided)	Tertiary	1	Southeast; north of Salt Lake City; central
Wasatch/Colton Formation	Lower Eocene to Paleocene	5	Uinta Basin
Webber Sandstone	Lower Permian to Pennsylvanian	2	Uinta Basin

^a Designations based on geologic map by Hintze (1980) and information in Hintze (1993).

TABLE N-10 PFYC Classes by Formation for Corridors and Corridor Segments under the Proposed Action, Washington^a

Formation/Rock Type	Age	Class	General Location
Columbia River Basalt Group	Lower Pliocene to Upper Miocene	1	Cascade Mountains
Continental Sedimentary rocks	Tertiary	3	Cascade Mountains
Metamorphic rocks (gneiss)	Mesozoic	1	Cascade Mountains
Intrusive rocks	Tertiary, Cretaceous	1	Cascade Mountains
Volcanic rocks	Tertiary	1	Cascade Mountains

^a Designations based on geologic map by Schuster (2005).

TABLE N-11 PFYC Classes by Formation for Corridors and Corridor Segments under the Proposed Action, Wyoming^a

Formation	Age	Class ^b	General Location
Amsden Formation	Pennsylvanian to Upper Mississippian	3	Wind River Basin; Great Divide Basin
Battle Spring Formation	Eocene to Upper Paleocene	3	Great Divide Basin; Green River Basin
Baxter Shale	Upper Cretaceous	3	Green River Basin
Bighorn Dolomite	Upper Ordovician	2	Bighorn Basin; Wind River Basin
Bridger Formation	Middle Eocene	5	Green River Basin
Casper Formation	Permian to Pennsylvanian	3	South of Casper
Chugwater Group or Formation	Triassic	3	Bighorn Basin; Wind River Basin; south of Casper; Great Divide Basin
Cloverly Formation	Lower Cretaceous	5	Bighorn Basin; Wind River Basin; south of Casper; Hanna Basin; Great Divide Basin
Coalmont Formation	Eocene and Paleocene	3	Hanna Basin
Cody Shale	Upper Cretaceous	3	Bighorn Basin; Wind River Basin
Darby Formation	Mississippian to Devonian	2	Bighorn Basin; Wind River Basin
Dinwoody Formation	Lower Triassic	3	Wind River Basin
Ellis Group	Upper to Middle Jurassic	3	Bighorn Basin
Ferris Formation	Paleocene to Upper Cretaceous	5	Hanna Basin
Flathead Sandstone	Middle Cambrian	2	Bighorn Basin; Wind River Basin
Forelle Limestone	Permian	2	South of Casper
Fort Union Formation	Paleocene	3	Bighorn Basin; Wind River Basin; Great Divide Basin; Green River Basin
Fountain Formation	Upper to Middle Pennsylvanian	2	South of Casper
Fox Hills Formation	Upper Cretaceous	3	Great Divide Basin
Frontier Formation	Upper Cretaceous	3	Bighorn Basin; Wind River Basin; south of Casper; Hanna Basin; Great Divide Basin
Gallatin Group or Limestone	Upper Cretaceous	2	Bighorn Basin; Wind River Basin
Goose Egg Formation	Lower Triassic to Permian	2	Bighorn Basin; south of Casper; Great Divide Basin
Green River Formation	Middle to Lower Eocene	5	Great Divide Basin; Green River Basin
Gros Ventre Formation	Upper and Middle Cambrian	2	Bighorn Basin; Wind River Basin
Gypsum Springs Formation	Middle Jurassic	3	Bighorn Basin; Wind River Basin; Hanna Basin
Hartville Formation	Permian to Mississippian (?)	3	South of Casper
Hoback Formation	Paleocene	5	Great Divide Basin; Green River Basin
Indian Meadows Formation	Lower Eocene	5	Wind River Basin
Lance Formation	Upper Cretaceous	5	Bighorn Basin; Wind River Basin; Great Divide Basin
Lewis Shale	Upper Cretaceous	3	Bighorn Basin; Hanna Basin; Great Divide Basin

TABLE N-11 (Cont.)

Formation	Age	Class ^b	General Location
Madison Limestone	Mississippian to Upper Devonian	3	Bighorn Basin; Wind River Basin; Hanna Basin
Medicine Bow Formation	Upper Cretaceous	3	Hanna Basin
Meeteetse Formation	Upper Cretaceous	3	Bighorn Basin; Wind River Basin
Mesaverde Group or Formation	Upper Cretaceous	3	Bighorn Basin; Wind River Basin; Hanna Basin; Great Divide Basin
Morrison Formation	Upper Jurassic	5	Bighorn Basin; Wind River Basin; south of Casper; Great Divide Basin
Mowry Shale	Lower Cretaceous	3	Bighorn Basin; Wind River Basin; south of Casper; Hanna Basin; Great Divide Basin
Niobrara Formation	Upper Cretaceous	5	South of Casper; Hanna Basin; Great Divide Basin
Nugget Sandstone	Jurassic (?) and Triassic (?)	3	Wind River Basin
Pass Peak Formation	Lower Eocene	3	Green River Basin
Phosphoria Formation	Permian	3	Wind River Basin
Satanka Shale	Permian	2	South of Casper
Steele Shale	Upper Cretaceous	3	South of Casper; Hanna Basin; Great Divide Basin
Sundance Formation	Upper Jurassic	5	Bighorn Basin; Wind River Basin; south of Casper; Great Divide Basin
Tatman Formation	Lower Eocene	5	Bighorn Basin
Tensleep Sandstone	Permian to Pennsylvanian	2	Wind River Basin; Great Divide Basin
Thermopolis Shale	Lower Cretaceous	3	Bighorn Basin; Wind River Basin; south of Casper; Hanna Basin; Great Divide Basin
Wagon Bed Formation	Middle Eocene	5	Wind River Basin
Wasatch Formation	Lower Eocene	5	Great Divide Basin; Green River Basin
Washakie Formation	Upper Eocene	5	Great Divide Basin
White River Group	Oligocene and Eocene	5	South of Casper
Willwood Formation	Lower Eocene	5	Bighorn Basin
Wind River Formation	Lower Eocene	5	Wind River Basin; south of Casper; Hanna Basin

^a Designations based on geologic map by Christiansen (1986).

^b Class assignments taken from Table A30-1 (of Appendix 30) in BLM (2004).

TABLE N-12 Types and General Locations of Quaternary Sediments Located in the Vicinity of the Corridors and Corridor Segments under the Proposed Action, by State

Map Unit Descriptions	Age	General Location
<i>Arizona</i>		
Surficial deposits in valleys and wind-blown sand on floodplains and playas	Holocene to Middle Pleistocene	Colorado Plateau (near northern border); Mojave Basin and Range (northwest); Sonoran Basin and Range (southwest); Central Mountains; south of Tucson; southern border
Young alluvium	Holocene to Upper Pleistocene	Mojave Basin and Range (northwest); Sonoran Basin and Range (southwest); Central Mountains
Older surficial deposits, including wind-blown sand	Middle Pleistocene to Upper Pliocene	Central Mountains
<i>California</i>		
Alluvium, lake, playa, and terrace deposits (nonmarine)	Quaternary ^a	North of San Francisco; Mojave Basin and Range; Southern California Mountains (northeast of Los Angeles); southeast of Los Angeles; Sonoran Basin and Range (east of San Diego)
Marine and nonmarine sand deposits	Quaternary	North of San Francisco; Southern California Mountains (northeast of Los Angeles); southeast of Los Angeles; Sonoran Basin and Range (east of San Diego)
Loosely consolidated sandstone, shale, and gravel deposits	Pleistocene and/or Pliocene	Southern California Mountains (northeast of Los Angeles); southeast of Los Angeles
<i>Colorado</i>		
Alluvium	Quaternary	Sand Wash Basin; Piceance Basin; west of Colorado Springs
Gravel and alluvium	Quaternary	Sand Wash Basin; Piceance Basin; San Juan Mountains; west of Colorado Springs
Eolian deposits	Quaternary	Sand Wash Basin
Older gravel and alluvium	Quaternary	Sand Wash Basin; Piceance Basin; San Juan Mountains
Landslide deposits	Quaternary	Middle Park Basin
Glacial drift deposits	Pleistocene	West of Colorado Springs

TABLE N-12 (Cont.)

Map Unit Descriptions	Age	General Location
<i>Idaho</i>		
Alluvium, with glacial deposits and colluvium	Quaternary	North (north of St. Joe River); Snake River Plain (west); south
Detritus, basin-fill	Quaternary	Snake River Plain (west); south
Waterlaid detritus	Pleistocene	
Outwash, fanglomerate, flood and terrace gravels	Pleistocene	North (north of St. Joe River); Snake River Plain (west)
Stream and lake deposits	Pleistocene and Pliocene	Snake River Plain (west)
Wind-blown loess	Pleistocene	North (north of St. Joe River)
Glacial lake and shoreline sediments	Pleistocene	Snake River Plain (west); south
Fanglomerate, colluvium, and gravel deposits	Pleistocene	Snake River Plain (west)
<i>Montana</i>		
Stream, glacial and lake deposits	Quaternary	Southwest corner of Montana
<i>Nevada</i>		
Alluvial deposits	Holocene to Upper Miocene	South, crossing Pahrump Valley; south, west of McCollough Range; southeast of Las Vegas; Las Vegas Valley; southwest border, along I-95; east of Reno; north of Reno; east-west line; northeast corner of Nevada; north-south line
Playa, marsh, and alluvial-flat deposits	Holocene to Upper Miocene	Northeast of Las Vegas; Las Vegas Valley; southwest border, along I-95; north of Reno; north-south line
Older alluvial deposits	Holocene to Upper Miocene	East-west line
Landslide deposits	Holocene to Upper Miocene	East-west line

TABLE N-12 (Cont.)

Map Unit Descriptions	Age	General Location
<i>New Mexico</i>		
Eolian and piedmont deposits	Holocene to Middle Pleistocene	Southeast, along Mescalero Ridge
Alluvium	Holocene to Upper Pleistocene	Southwest, along I-10; southwest, along I-25 and Rio Grande River; northwest, west/southwest of San Juan Basin
Piedmont alluvial deposits	Holocene to Lower Pleistocene	Southeast, along Mescalero Ridge; Southwest, along I-10; southwest, along I-25 and Rio Grande River
Older alluvial deposits	Middle to Lower Pleistocene	Southeast, along Mescalero Ridge
Lacustrine and playa deposits	Holocene	Southwest, along I-10
<i>Oregon</i>		
Lacustrine and fluvial sedimentary rocks	Pleistocene	Northwest of Portland; southwest of Portland; southeast of Salem; southwest of Catlow Valley; southeast corner of Oregon; northern border; central east-west line; central north-south line
Sedimentary rocks	Pleistocene and Pliocene	Northwest of Portland; southwest of Portland; southeast of Salem
Terrace and pediment gravels	Pleistocene and Pliocene	Southeast corner of Oregon; central north-south line
Glacial deposits	Pleistocene	Southwest of Portland
Alluvial deposits	Holocene	Southeast of Catlow Valley; southeast corner of Oregon; northern border; eastern border, just west of Snake River; central north-south line
Playa deposits	Holocene	Southwest of Catlow Valley; southeast Oregon
Terrace, pediment, and lag deposits	Holocene and Pleistocene	Southeast Oregon
Landslide and debris-flow deposits	Holocene and Pleistocene	Eastern border, just west of Snake River; south of Medford
Dune sand	Holocene	Southeast corner of Oregon; central east-west line
Loess	Holocene and Pleistocene	Northern border
Glaciofluvial, lacustrine, and pediment sedimentary deposits	Pleistocene	Northern border
Fanglomerate (alluvial fan debris, slope wash, colluvium, and talis with fragments of basalt and andesite)	Holocene	South of Medford; north of Medford; central east-west line; central north-south line

TABLE N-12 (Cont.)

Map Unit Descriptions	Age	General Location
<i>Utah</i>		
Alluvium	Quaternary	Uinta Mountains; Uinta Basin; central; southwest
Glacial deposits	Quaternary	Uinta Mountains; Uinta Basin
Older alluvial deposits	Quaternary	Uinta Basin; southeast
Mud and salt flats	Quaternary	Great Salt Lake Desert
Eolian deposits		Great Salt Lake Desert; southwest; southeast
Lake Bonneville deposits		Great Salt Lake Desert; central; north of Salt Lake City
Marshes		Great Salt Lake Desert
Alluvial deposits, gravel	Quaternary to Tertiary	Central
<i>Washington</i>		
Mass wasting deposits		Cascade Mountains
Alluvium		Cascade Mountains
Alpine glacial drift	Pleistocene	Cascade Mountains
<i>Wyoming</i>		
Alluvium, colluvium, pediments, fan deposits, and lacustrine deposits	Quaternary	Bighorn basin; Hanna Basin
Dunes and loess deposits	Quaternary	Wind River Basin
Landslide deposits	Quaternary	Great Divide Basin

^a The Quaternary period includes the Pleistocene (1.8 million to 10,000 years ago) and the Holocene (10,000 years ago to the present) epochs. For units listing "Quaternary" as the unit age, the specific epochs were not differentiated on the state geologic map.

REFERENCES

- Berman, D.S., 1993, "Lower Permian Vertebrate Localities of New Mexico," in *Vertebrate Paleontology in New Mexico*, Bulletin 2, S.G. Lucas and J. Zidek (eds.), New Mexico Museum of Natural History and Science, Albuquerque, N.M.
- BLM (Bureau of Land Management), 2004, *Rawlins Resource Management Plan, Draft Environmental Impact Statement*, Rawlins Field Office, Rawlins, Colo., Dec.
- BLM, 2005, *Little Snake Resource Management Plan Analysis of the Management Situation*, Little Snake Field Office, Craig, Colo., April.
- Bond, J.G., and C.H. Wood, 1978, *Geologic Map of Idaho*, published by the Idaho Department of Lands, Bureau of Mines and Geology, Moscow, Idaho, with contributions from the U.S. Geological Survey. Scale 1:500,000.
- Christiansen, R.D., 1986, *Wyoming Geologic Highway Map*, published by Western Geographics with cooperation of the Geological Survey of Wyoming, Canon City, Colo. Scale 1:1,000,000.
- Hintze, L.F., 1980, *Geologic Map of Utah*, published by the Utah Geological and Mineral Survey, Salt Lake City, Utah. Scale 1:500,000.
- Hintze, L.F., 1993, *Geologic History of Utah*, Department of Geology, Brigham Young University, Provo, Utah.
- Jennings, C.W., R.G. Strand, and T.H. Rogers, 1977, *Geologic Map of California*, published by the California Department of Conservation, Division of Mines and Geology, Sacramento, Calif. Scale 1:750,000.
- Kamilli, R.J., and S.M. Richard, 1998, *Geologic Highway Map of Arizona*, published jointly by the Arizona Geological Society and the Arizona Geological Survey, Tucson, Ariz. Scale 1:1,000,000.
- Lucas, S.G., and T.E. Williamson, 1993, "Eocene Vertebrates and Late Laramide Stratigraphy of New Mexico," in *Vertebrate Paleontology in New Mexico*, Bulletin 2, S.G. Lucas and J. Zidek (eds.), New Mexico Museum of Natural History and Science, Albuquerque, N.M.
- Nations, D., and E. Stump, 1996, *Geology of Arizona*, Second Edition, Kendall/Hunt Publishing Company, Dubuque, Iowa.
- Ross, C.P., D.A. Andrews, and I.J. Witkind, 1955, *Geologic Map of Montana*, published by the U.S. Geological Survey, Department of the Interior, Denver, Colo. Scale 1:500,000.
- Scholle, P.A., 2003, *Geologic Map of New Mexico*, published by the New Mexico Bureau of Geology and Mineral Resources, New Mexico Institute of Mining and Technology, Socorro, N.M. Scale 1:500,000.
- Schuster, J.E., 2005, *Geologic Map of Washington State*, published by the Washington State Department of Natural Resources, Olympia, Wash. Scale 1:500,000.
- Stewart, J.H., and J.E. Carlson, 1978, *Geologic Map of Nevada*, published by the U.S. Geological Survey, Department of the Interior (Reston Va.) in cooperation with the Nevada Bureau of Mines and Geology, Reno, Nev. Scale 1:500,000.
- Tweto, O., 1979, *Geologic Map of Colorado*, published by the U.S. Geological Survey, Department of the Interior, Reston, Va. Scale 1:500,000.

Walker, G.W., and N.S. MacLeod, 1991, *Geologic Map of Oregon*, published by U.S. Geological Survey, Department of the Interior, Denver, Colo. Scale 1:500,000.

Williamson, T.E., and S.G. Lucas, 1993, "Paleocene Vertebrate Paleontology of the San Juan Basin, New Mexico," in *Vertebrate Paleontology in New Mexico*, Bulletin 2, S.G. Lucas and J. Zidek (eds.), New Mexico Museum of Natural History and Science, Albuquerque, N.M.

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