

## **Appendix B. Integrated Weed and Pest Management Plan**

### **INTRODUCTION**

This Integrated Pest Management Plan (IPMP) is for Anadarko Petroleum Corporation's (APC) proposed well location in the Crazy Cat East project area. This project is in Johnson and Campbell Counties, Wyoming including:

Township 45 North, Ranges 76 and 77 West, Township 46 North, Ranges 76 and 77 West, Township 47 North, Range 77 West (approximately 56 sections)

The project area is 16 miles from Sussex, Wyoming, 18 miles from Linch, Wyoming, and 36 miles from Buffalo, Wyoming. The project area is situated on sparse dry herbaceous rangeland and sagebrush east of the Powder River. The overall project area is the Powder River Basin, a Level IV Eco-Region located in the Northwestern Great Plains Level III Eco-Region - an area of rolling plains (short-grass prairie) that is predominately used for dryland farming and livestock grazing (Chapman et al. 2004). The topography is moderately rough terrain with many ridges and deep draws. The elevation in the project area is approximately 5,000 feet above sea level. Characteristic vegetation is big sagebrush, western wheatgrass, prairie junegrass, green needlegrass, Kentucky bluegrass, and needle-and-thread grass. Other typical species are threadleaf sedge, rubber rabbit brush, fringed sagewort, and Sandberg bluegrass. This area is managed as rangeland for livestock grazing.

Noxious weeds are those plants introduced into an area that cause significant economic and/or ecological impact as designated by the State of Wyoming and those species declared noxious by the Johnson and Campbell Counties Weed and Pest Control Districts. With the development in the Crazy Cat East POD and associated land disturbance, it is APC's goal to minimize its impact on the current plant community and to make every effort to put into place this IPMP in order to avoid any noxious weed or weed of concern problems with the project.

#### **1.1 Noxious Weed Control**

APC will use an integrated approach to control known noxious weeds or weeds of concern throughout construction, production, and reclamation of the Crazy Cat East project. Weed species, location, landscape and soils will all be taken into consideration when determining the best method of control as well as the surrounding vegetation and land use using a combination of the following methods:

##### **Education:**

- APC will provide periodic weed education and awareness programs for its employees and contractors.
- Employees and contractors will be encouraged to report any new noxious weed infestations to the APC representative responsible for weed management.
- Field employees and contractors will be notified of known noxious weeds or weeds of concern in the project area. Measures will be taken to avoid these areas when possible and control methods used in areas of APC activity.

##### **Cultural:**

- Areas of disturbance will be promptly re-seeded with a certified weed free seed mixture approved by the Bureau of Land Management (BLM), or surface owner.
- Certified weed-free mulch will be used in necessary locations.
- Vehicles and equipment may require cleaning or washing down before leaving or entering areas of known noxious weed infestations.
- Surface disturbance will be minimized to the extent consistent with APC's right to economically develop its mineral resources.

**Physical:**

- In newly reseeded areas, mowing will be considered during the first season of establishment, prior to seed formation of weeds of concern.
- Hand pulling of weeds will be considered for small or new infestations.

**Biological:**

- Domestic animals or Approved biological agents may be used in areas most suited for this type of control, taking into consideration species, desired results, and management needs.
- On BLM surface a Biological Control Agent Release Proposal would be obtained before the release of any biological control agents.

**Chemical:**

- The use of herbicides to control noxious weeds has been found to be very effective and feasible. Herbicides used will be specific for target species, location and follow label instructions in order to obtain desired control for identified species.
- Application of herbicides will be done by a commercially licensed applicator.
- On BLM administered public lands, an approved Pesticide Use Permit (PUP) will be obtained from the local BLM office. Only herbicides approved for application on BLM administered lands will be used.
- Control/treatment of noxious weeds/weeds of concern on private surface will be done in accordance with the existing Surface Use Agreement.

## 1.2 Target Species Management

**Field Bindweed (*Convolvulus arvensis L.*):** A long-lived perennial that spreads by seed or root, producing a dense ground cover. Twining stems vary from 1.5 to 6 feet in length. Plants have white or pink, funnel-shaped flowers and smooth leaves, 1 to 2 inches in length and often shaped like arrowheads. Seeds are dark, brownish-gray, about 1/8 inch long, and borne in two-celled, egg-shaped capsules containing 2 seeds per cell.

**Management Objective:** Containment.

**Integrated treatment:**

**Chemical:** Effective control agents include 2,4-D, MCPA, Banvel, or Clarity. Roundup can be effective for extensive infestations. Tordon may be effective in non-crop areas.

**Biological:** No effective biological agent known.

**Cultural:** Establishment of desirable competitive plants will help with long term reduction of field bindweed.

**Physical/Mechanical:** Continuous tillage and cultivation before flowering may help reduce seed production.

**Diffuse Knapweed (*Centaurea diffusa Lam.*):** Diffuse Knapweed (*Centaurea diffusa*), also known as White Knapweed or Tumble Knapweed, can act as an annual, biennial or short-lived perennial plant, generally growing to between 10 and 60 cm in height. It has a highly branched stem and a large taproot, as well as a basal rosette of leaves with smaller leaves alternating on the upright stems. Flowers are usually white or pink and grow out of urn-shaped heads carried at the tips of the many branches. It often assumes a short rosette form for one year, reaching maximum size, then rapidly growing and flowering during the second year. A single plant can produce approximately 18,000 seeds.

**Management Objective:** Containment.

**Integrated treatment:**

**Chemical:** Broadleaf herbicides applied during the vegetative or growth stage are most effective. Clopyralid, the active ingredient in Curtail, Transline, Stinger, and Redeem provide good control when applied early. Tordon may be effective in non-crop areas.

**Biological:** A combination bio-control agents, including seed head agents and root borers are most effective at controlling diffuse knapweed.

**Cultural:** Diffuse knapweed usually grows in sandy to gravelly soils where desirable vegetation is unable to compete.

**Physical/Mechanical:** Digging and sufficiently severe fire can successfully remove diffuse knapweed. Cutting can reduce the spread of seeds, but is otherwise ineffective.

**Russian Knapweed (*Centaurea repens L.*):** A perennial that forms dense colonies and spreads by creeping rootstalks and seeds. Stems are erect, openly branched 18 to 36 inches tall ending with a single cone shaped flowering head. Flowers are pink to lavender. Leaves and stems are covered with short stiff hairs. Seeds are flattened, ivory colored and retained in cup-shaped seed heads.

**Management Objective:** Containment.

**Integrated treatment:**

**Chemical:** Picoloram with 2, 4-D or Curtail are effective control agents.

**Biological:** No effective biological agent known.

**Cultural:** Reseed perennial grasses into treated areas. Grazing is not an effective method of control.

**Physical/Mechanical:** Repeated plowing or tillage treatment will reduce density. Burning, or mowing is not effective.

**Saltcedar (*Tamarix ramosissima*):** Shrub or small tree grows up to 20 feet tall and spreads by seed. Bark on saplings and stems is reddish-brown. Leaves are small and scale-like, on highly branched slender stems. Flowers are pink to white, 5-petaled. A tree/shrub can produce 500,000 seeds that are easily dispersed by the wind. It establishes in disturbed and undisturbed streams, waterways, bottomlands, banks and drainage washes of natural or artificial water bodies, moist rangelands and pastures, and other areas where seedlings can be exposed to extended periods of saturated soil for establishment. Saltcedar can grow on highly saline soils containing up to 15,000 ppm soluble salt and can tolerate alkali conditions. They have long taproots that allow them to intercept deep water tables and interfere with natural aquatic systems.

**Management Objective:** Containment.

**Integrated treatment:**

**Chemical:** For extensive infestations of saltcedar, chemical control has been shown to be the most effective method. Dicamba, 2, 4-D and Tebuthiuron can provide some control of Saltcedar. Imazsapyr provides good control of saltcedar. In areas where saltcedar are growing in water, along stream banks, wetlands or other waterways, products applied will be registered for aquatic use.

**Biological:** A mealy bug (*Trabutina mannipara*) and a leaf beetle (*Diorhabda elongata*), have preliminary approval for release to control saltcedar.

**Cultural:** Cutting, bulldozing or burning of saltcedar has been relatively ineffective as a means of control.

**Physical/Mechanical:** Flooding can be used to control salt cedar if root crowns remain submerged for at least three months. Root plowing is a mechanical tool that has been successful in managing saltcedar infestations if properly performed.

**Scotch Thistle (*Onopordum acanthium L.*):** Biennial that grows up to 12 feet tall that reproduces by seed only. Rosette formed the first year, and flowering stem elongates the second year. Leaves are large

coarsely lobed, hairy on both sides, velvety gray appearance. Margins are lined with sharp conspicuous spines. Basal leaves can grow to 2 feet long and 1 foot wide. Flowers are violet to reddish.

**Management Objective:** Containment.

**Integrated treatment:**

**Chemical:** Because of their shorter life cycle, scotch thistle can be effectively controlled by herbicides. 2, 4-D and picloram are both effective control agents.

**Biological:** No biological controls are available at this time.

**Cultural:** Plant competition is an effective way to prevent the invasion of musk thistle. Proper management of perennial grasses will inhibit the establishment of this weed.

**Physical/Mechanical:** Mowing will not kill the plant but will lessen the seed production if it keeps the seed heads from maturing. Small areas can be eradicated by cutting the plant off below the soil surface.

**Canada Thistle (*Cirsium arvense L.*):** A colony forming perennial that reproduces from seed and creeping rootstalks and can grow up to 4 feet tall. Leaves vary from light to dark green, oblong or lance shaped with deeply grooved spiny toothed margins. Flowers form in small bristly clusters that are light lavender to deep rose purple.

**Management Objective:** Containment.

**Integrated treatment:**

**Chemical:** 2, 4-D, Picloram, Dicamba and Curtail are all effective control agents.

**Biological:** Canada thistle stem weevil; Canada thistle bud weevil; Thistle stem gall fly.

**Cultural:** Plant competition is an effective way to prevent the invasion of Canada thistle. Proper management of perennial grasses will inhibit the establishment of this weed.

**Physical/Mechanical:** Hand pulling is not effective. Cultivation will reduce density if done repeatedly every three to four weeks.

**Common Cocklebur (*Xanthium strumarium*):** An annual that grows 2 to 4 feet tall. The stem is erect, branched ridged, spotted and very rough. Leaves are triangular or heart-shaped, rough on both sides. Flower heads are small and form 1 inch long woody, fruit covered with hooked prickles and two curved spines at the tip. Seeds are dark brown and flattened with pointed tips.

**Management Objective:** Containment.

**Integrated treatment:**

**Chemical:** 2, 4-D and picloram are effective at controlling common cocklebur.

**Biological:** None known.

**Physical/Mechanical:** Hand pulling can be used in small areas.

**Buffalo Bur (*Solanum rostratum*):** Taprooted annual also known as Kansas thistle and prickly nightshade. Bears long, yellow spines on stems, leaves, and flower heads and can grow to a height of 2 feet. It is common in sandy, exposed soil and is highly drought-resistant. Bright yellow flowers are evident in summer and spines cover the calyx; it enlarges and forms a spiny bur, enclosing and completely covering the seedpod.

**Management Objective:** Containment

**Integrated Treatment:**

**Chemical:** Dicamba, Triclopyr, and 2,4-D are effective control agents.

**Biological:** None identified.

**Physical/Mechanical:** Repeated close mowing and hand pulling when the soil is moist is effective.

**Wild Licorice (*Glycyrrhiza lepidota Pursh*):** Wild licorice is a perennial reproducing from deep, spreading roots or seeds. Stems 1 to 3 feet tall, erect, simple or with upper part producing erect branches.

Leaves alternate, pinnately compound with 11 to 19 deeply veined lanceolate leaflets with glandular dots when mature. Flowers in short axillary spikes on long peduncles; calyx with 2 upper teeth shorter and partly united; corolla with narrow standard and blunt keel, green-white to white, stamens - 9 fused by filaments and 1 separate. Seed pod about 1/2 to 3/4 inch long, burlike, covered with stout, hooked prickles; seeds to 1/10 inch long, bean-shaped, reddish-brown, smooth and dull.

**Management Objective:** Containment.

**Integrated treatment:**

**Chemical:** Licorice can be controlled with Transline at 1 pint per acre. This plant is very resistant to herbicides, but clopyralid, the active ingredient in Transline, Redeem, Curtail, Widematch, and Stinger, is very effective.

**Biological:** No effective biological agent known.

**Cultural:** Grazing is not an effective method of control.

**Physical/Mechanical:**

**Black Henbane (*Hyoscyamus niger*):** Black Henbane (*Hyoscyamus niger*) is covered with greasy hairs and has a thick, fleshy taproot. Stems are upright, tough – almost woody - and can be very thick. Plants can grow to 1m or taller and may be branched or unbranched. Leaves are alternate, large – up to 15 cm wide and 20 cm or more long – and have a heavy, foul scent. Leaf edges are shallowly lobed (variable) and veins are conspicuous. Flowers are pale yellow with deep purple veins and throats and are borne on spikes. Flowers are hermaphroditic – both male and female organs – and have a strong, unpleasant smell. The flower base forms a 2.5 cm urn-shaped fruit with a thickened lid that pops off at maturity and spills the numerous, tiny, black-brown seeds is primarily by seed production and sprouting from lateral roots to a lesser extent. Black henbane grows in a wide range of soil textures and pH but does require well drained soil. It does not tolerate shade. Black henbane usually establishes on disturbed or heavily grazed sites where it competes for moisture and nutrients with desirable plants. All parts of the plant are potentially poisonous. All parts of the plant are poisonous to animals and humans.

**Management Objective:** Containment

**Integrated Treatment:**

**Chemical:** Picloram, dicamba, metsulfuron, 2,4-D, and glyphosate can used pre-bloom.

**Biological:** None to date in the United States.

**Cultural:** Does not survive cultivation. Livestock will avoid Black henbane unless no other forage is available, therefore poisoning cases are rare. Dried plant matter in baled forage retains its toxic properties though, and will be readily consumed.

**Physical/Mechanical:** Mowing is effective, but difficult because of its thick, tough stem. Hand pulling is also effective, but be sure to wear gloves and protective clothing to prevent rashes.

### 1.3 Mosquito Control

Wyoming along with many other western states has seen the introduction of West Nile Virus. The most common way for the spread of this virus is through mosquito bites. APC is aware that its development could include water impoundments that may contribute to mosquito reproduction. APC will work closely with the Johnson and Campbell Counties Weed & Pest Boards to address areas that may be potential breeding sites for mosquitoes and use recommended and approved products to control mosquito populations. APC will continue to communicate with the weed and pest board in order to stay current on new mosquito treatment techniques and ways to reduce breeding sites.

**Field Bindweed (*Convolvulus arvensis* L.)**



**Diffuse Knapweed (*Centaurea diffusa* Lam.)**

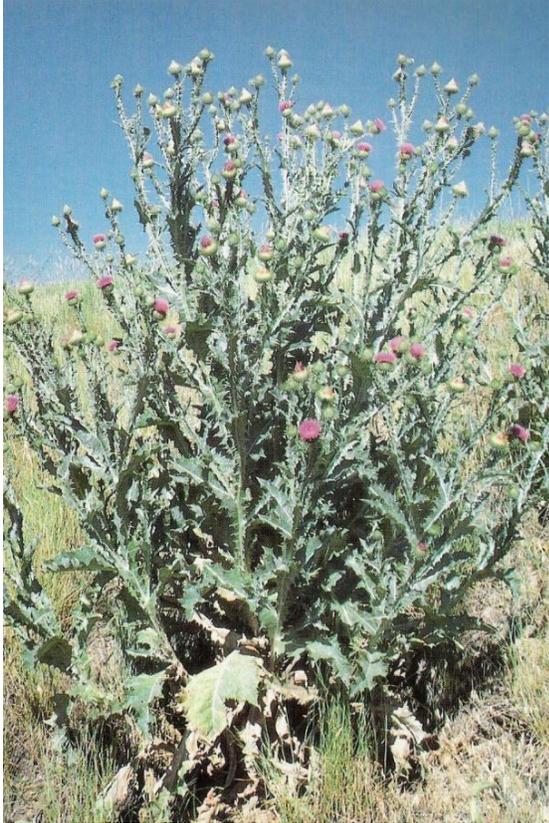


**Russian Knapweed (*Centaurea repens* L.)**



**Saltcedar (*Tamarix ramosissima*)**

**Scotch thistle (*Onopordum acanthium* L.)**



**Canada thistle (*Cirsium arvense* L.)**



**Common Cocklebur (*Xanthium strumarium*)**



**Buffalobur (*Solanum rostratum* Dunal)**



**Wild Licorice (*Glycyrrhiza lepidota* Pursh)**



**Black Henbane (*Hyoscyamus niger*)**



#### **1.4 References**

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