Farm Service Co-op
Persia, Iowa
Preliminary Assessment

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CERCLIS No.

1. INTRODUCTION

Under authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), the Superfund Amendments and Reauthorization Act of 1986 (SARA), and a State/EPA agreement, the Iowa Department of Natural Resources (IDNR) conducted a preliminary assessment (PA) at a site known as Farm Service Co-op (FSC).

The purpose of this investigation was to collect information concerning conditions at FSC sufficient to assess the threat posed to human health and the environment and to determine the need for additional CERCLA/SARA or other appropriate action.

The scope of this investigation included review of available file information, a comprehensive target survey, and an onsite reconnaissance to collect information and photographs (Fig.1-1).

2. SITE DESCRIPTION, OPERATIONAL HISTORY, AND WASTE CHARACTERIZATIONS

2.1 Location

The facility is located on the east edge of Persia, Iowa. To reach the site, take Highway 191 into Persia. The co-op office is located northeast of the junction of 191 and county road F58, near the elevator. The property where the complaints originated is located on county road F58 just east of HWY 191 and the railroad tracks (Fig.2-1; Fig.2-2). The geographic coordinates of the northwest corner of the co-op warehouse are 41° 34' 45.51" N latitude and 95° 34' 0.70" W longitude (Ref.1).

2.2 Climate

The average summer temperature in Persia is 72.7 °F with daytime temperatures reaching 90° F or more. The winter months average 21.8° F and the average annual rainfall is 29.9 inches (Ref.2,p.103).

2.3 Site Description

FSC consists of several buildings located on the east side of Persia, a small rural town. The facility warehouse, near the area where the complaints originated, is bounded by the town of Persia to the west, farm fields to the north, a county road to the south and farm fields to the east (Fig.1-1; Fig.2-2). A private residence is located just southeast of the warehouse (Fig.1-1,#11). The office and chemical storage warehouse were formerly located south of the county road (Fig.2-2; Ref.3,p.2 and map) but have been relocated north of the county road near the elevator (Fig.2-3; Ref.24).

A water hydrant was formerly located on the south property line of the private residence, adjacent to the west edge of the private residence's driveway (Fig.2-2; Fig.1-1,#12; Ref.5,p.2). This hydrant was formerly used by the co-op to fill applicator and water trucks prior to field applications of agricultural chemicals. In 1985, the water load-out area was moved to a location on the co-op property, immediately adjacent to the southwest corner of the private property (Fig.2-2; Ref.5,p.4). In 1987, the water load-out/mixing area was moved to a location east of the elevator and approximately 1000 feet to the north of the private residence and a containment pad was installed (Fig.2-3; Ref.24).

A shared drainage ditch drains to the south, between the private property and the co-op property (Fig.1-1,#13; Fig.2-2; Ref.5,p.2). Another drainage ditch is located parallel to the south borders of both properties and drains to the east (Fig.1-1,#12; Fig.2-2). The terrain is relatively flat but drains gently to the east/southeast (Fig.2-1; Ref.13).

The facility is not fenced and the only warning sign observed was on the co-op office (Ref.24).The extent of contamination is unknown so a conservatively estimated area of 62,500 square feet is proposed.

2.4 Operational History and Waste Characteristics:

FSC is a retail chemical operation which began operation sometime around 1979 to 1981 (Ref. 14). The facility stores mixes and applies agricultural chemicals. One of the services historically offered by the co-op has been the custom application of farm chemicals. To offer this service, the co-op would mix packaged farm chemicals with water and/or solvents in a large bulk tank prior to field application (Ref.5,p.2). Mishandling of the chemicals has been alleged at the water load-out sites (Ref.5,p.3-4).

On June 10, 1987, a complaint was received by the Iowa Department of Agriculture regarding possible run-off from the co-op to adjacent private property. An investigation commenced and soil samples indicated levels of Bladex up to 7500 ppb, Atrazine up to 3200 ppb, Metalochlor (dual) up to 2600 ppb, Alachlor (Lasso) up to 410 ppb, Bentazon (Basagran) up to 8300 ppb and 2,4-D up to 3 ppb (Ref.15).

In June of 1989, a Civil Penalty Warning Citation was issued to the Branch Manager of FSC, stating that samples from foliage on the neighboring property had detected 140 ppb 2,4-D and 27 ppb 2-ethylhexyl ester 2,4-D residues. (Ref.4; Ref.16). Apparently, drift to neighboring property had occurred during the spraying of weeds on the FSC property (Ref.6).

A judgment was filed against the co-op in 1990 for damages incurred by the neighboring property owners. The court found that the co-op had been in violation of labels regarding the disposal of farm chemical containers and proper handling of the chemicals. (Ref.5, p.14). The judgment noted the following:

The private property was purchased by the plaintiff in the late summer of 1982. From 1983 to 1984, co-op personnel were observed loading trucks with water from a hydrant located on the property line Fig.2-2). Those trucks were used for chemical application to farm fields. Neighbors observed the trucks overflowing on numerous occasions (Ref.5,p.3-4). During the spring of 1984, co-op personnel were observed mixing chemicals immediately west of the private property and leaving the empty chemical containers at the mixing site until later in the day. The neighbors observed loss of vegetation around the hydrant during the period from 1983 to 1984 (Ref.5,p.3).

In 1985, the co-op installed an alternative site to obtain water. This site was located immediately adjacent to the southwest corner of the same neighbors property (Fig.2-2; Ref.5,p,4). At the second site, chemical containers were left at the site and were discarded in a ditch along the south side of the neighbors property. Dumping of unused spray wash, rinsing of vehicles and tanks and chemical drift were observed by the neighbors. These activities continued through the springs of 1985, 1986 and 1987. During these periods, the south ditch was observed containing different colored liquids smelling of chemicals which had drained from the second mixing site. This site was used at a minimum of one or two times per day during the springs of 1985, 1986 and 1987. A large number of customers were also allowed to use this mixing site while no instructions were posted and no co-op employees were present (Ref.5,p.4-5). Various tree, shrubs and plants located along the south and west ditches of the private property died or began to show signs of damage during the years of 1985 through 1987 (Ref.5,p.8). The second water load-out was closed in 1987. A containment area was installed about 1000 feet to the north and slightly west of the private residence and currently this is the only water load-out/mixing area for the co-op (Ref.24). The use of this water load-out/mixing area is reportedly limited to co-op employees (Ref.27). Groundwater samples indicated levels of Banvel in the private well and levels of Atrazine and Cyanazine in a monitoring well installed on the private property (Ref.5,p.7). END OF JUDGMENT

Apparently, only low levels of groundwater and soil contamination were documented (Ref.28), however, sampling data is incomplete. Attempts to acquire groundwater data were only partially successful. In 1989, analytical results were collected for Benzene, Toluene, Ethyl Benzene and Xylene (BETX), apparently due to objections from the co-op that dying vegetation was caused by a leaking underground tank located northwest of the co-op warehouse. This did not appear to be the case, as BETX, Purgable Hydrocarbons (PH) and Total Extractable Hydrocarbons (TEH) were not observed in the private monitoring well at levels above detection limits, however, three peaks were recorded as Atrazine, Cyanazine and an unknown (Ref.13,p.4).

A sample collected from MW-3 on the co-op property in July 1989, indicated levels of Atrazine at 0.38 ppb and Cyanazine (Bladex) at 0.32 ppb (Ref.23). The Lifetime Health Advisory Levels, which are the current applicable standards, are 3.0 ppb and 1.0 ppb, respectively so the detected levels were below State action levels. Analytical data for the private well was not located. Analytical data was insufficient to assess the site so three of the monitoring wells and the private well were sampled for common Iowa herbicides during the site reconnaissance. Levels of Atrazine up to 0.6 ppb and Prometron up to 0.16 were detected. The action levels of Atrazine and Prometron are 3 ppb and 100 ppb, respectively, so State action levels were not exceeded. It should be noted that these wells were not necessarily placed to detect the highest levels of agricultural chemical contamination at the site, indeed, most sampling (except for MW-3) appeared to be the result of an attempt to define petroleum contamination which was thought to originate to the north and west of these wells. These monitoring wells are hydraulically upgradient from the former mixing areas. Also, one would expect some degree of biodegredation to have taken place, and thus lower levels of contaminants, given the time that has elapsed since MW-3 was sampled in 1989 and sampled again in 1993. Atrazine was detected at a slightly higher level in 1993, which indicates the possibility of an unidentified source.

3. GROUND WATER PATHWAY

3.1 Hydrogeologic Setting

3.1(1) Regional:

Comparisons of topographic and bedrock maps indicate depth to the uppermost bedrock in the area is approximately 150 feet (Ref.17; Ref.18). The uppermost bedrock is Pennsylvanian and consists of cyclic deposits with prominent limestone beds and shale. Bonner Springs shale is the uppermost layer (Ref.19).

Soil is classified as Monona silt loam with 2% to 5% slopes. The Monona series consists of well-drained soils on crests and sides of ridges and some high benches. The soil was formed in loess that overlies alluvial sediment. In representative profile, the surface layer is typically about 12 inches thick and mainly very dark brown silt loam. The subsoil extends to a depth of about 30 inches and is brown friable silt loam. The substratum extends to a depth of about 60 inches and is brown, very friable silt loam with some mottling. The organic content is typically moderate or low and reaction is typically slightly acid in the surface layer and neutral in the subsoil. Permeability is moderate (Ref.8,p.32-33).

A well log for a 100 foot deep well, formerly owned by the nearby railroad, indicated 70' of loess underlain by about 10 feet of till . Sand and gravel were encountered from 80 to 100 feet (Ref.7).

3.1(2) Site Specific:

A 17 foot deep monitoring well was installed on the private property and the well log indicated 4.5 feet of lean clay overlaying 12.5 feet of silty clay with trace very fine sand (Ref.13, p.2).

Three 25 foot deep monitoring wells were installed on the co-op property and the associated well logs indicate 7 to 8 feet of dark brown to black silty topsoil overlaying slightly silty clay which extended to the bottom of the wells. The clay was noted as firm, getting soft at 13 feet and very soft at 16 feet. The clay was noted as firm or tight from 20 to 22 feet and again at 24 feet to the bottom of the wells (Ref.22). Locations of the monitoring wells and well logs are shown in Fig.3-1 and Fig.3-2, respectively. Initial groundwater levels were observed at 18 to 19 feet below ground surface on July 7, 1989 (Ref.22; Fig.3-2). Static water levels were observed to range from 11.4 to 12.7 feet below the top of the well casings on September 15, 1989. The water level measurements were used to estimate surficial groundwater contours and, based on these contours, groundwater flow appeared to be to the southeast with a hydraulic gradient of approximately 0.02 foot per foot (Fig.3-5; Ref.13,p.3 and Fig.2). Groundwater level measurements by the IDNR on March 9, 1993 indicated a static water level of 8.2 to 8.95 feet below the top of casing and supported the earlier findings of a southeasterly flow direction. The casing of MW-3 had been damaged and restraightened, which may partially account for a somewhat more easterly flow direction (Ref.24).

3.2 Ground water Targets

Persia is classified as a consecutive water supply, purchasing its water from Shelby Rural Water District. The municipal water supply wells are located approximately 15 miles to the southeast of the site, just north of Avoca (Ref.12). The wells are not downgradient from the site and are outside the target distance, so the municipal system is not considered at risk from this site (Fig.3-3; Ref.1). City of Persia personnel maintain the water distribution system only (Ref.11).

Five old municipal wells have been abandoned, four being plugged and one being capped and left as a monitoring well. This monitoring well is located approximately 170 feet south of the intersection of Third Street and Sixth Avenue (Ref.12,p.3) which is about 2000 feet southwest of the site.

Private wells which are used for drinking water almost certainly exist in the area, given the rural location. Likely locations of wells are shown on a plat map (Fig.3-4). Information regarding private wells is limited, however, no drinking water wells were identified within .25 mile of the site (Ref.12). The closest drinking water well may be about 2000 feet southeast of the site (Fig.3-4; Ref.25). A more thorough well survey is needed as many of the residences may be served by the Rural Water Association (RWA).

The existing monitoring wells and the nearest well were sampled for common Iowa herbicides. Levels of Atrazine up to 0.6 ppb and Prometron up to 0.16 ppb were detected in the groundwater. These levels are below action levels of 3.0 ppb and (proposed) 100 ppb, respectively (Ref.30). Levels of Desethyl Atrazine up to 0.42 and Desisopropyl Atrazine up to 0.2 were also detected but no groundwater standards were identified for these compounds. It should be noted that the wells were apparently not placed to intercept the area(s) of highest agricultural chemical contamination.

3.3 Ground water Conclusions

Municipal wells are located outside of the 4 mile radius and are not considered at risk from this site.

State action levels for common Iowa herbicides were not exceeded in the existing monitoring wells or in the nearest private well, however, it does appear that groundwater has been impacted. The locations of the wells suggest that additional groundwater sampling is warranted . A more thorough field survey of private wells may be needed.

SURFACE WATER PATHWAYS

4.1 Hydrologic Setting

Overland drainage from the site flows 700 to 800 feet east/southeast to Mosquito Creek, a minor tributary which flows in a southwesterly direction about 25 miles to the Missouri River (Ref.9; Ref.17; Ref.20,p.6)). No gauging stations were located on Mosquito Creek.

Mosquito Creek was observed during the site reconnaissance and no obvious signs of chemical stress were noted, however, the creek was observed prior to the growing season when signs of chemical stress might be difficult to see. Reportedly, during the spring of 1990, digging occurred in the farm fields east of the co-op from the area of the current containment system directly toward Mosquito Creek. The possibility of a drain tile was brought up and co-op emplyees stated that they had no knowledge of a tile or of any digging in the area (Ref.31).

The site is located within a "special flood hazard area" (Ref.26; Fig.4-1) and could be susceptible to flooding in extreme weather, however, the depth of the channel of Mosquito Creek plus the elevation of the site indicate that severe flooding is unlikely (Fig.1-1,#10; Fig.2-1).

During wet weather the drainage ditch can become quite full of water, which backs up into the yard of the private residence. In the past, this surface run-off has been considered a source of contamination (Ref.5). A considerable amount of soil erosion was noted in areas draining toward Mosquito Creek (Ref.24; Fig.1-1).

4.2 Surface Water Targets

No drinking water intakes were identified within 15 miles downstream of the site. One intake was located and is permitted for hydrologic testing (Ref.1; Fig.4-1).

No significant fisheries were located within the target distance of 15 downstream miles. The County Conservation Board administers a 147 acre tract known as Arrowhead Park which is located about 10 miles southwest of the site (Ref.21).

4.3 Surface Water Conclusions

Contamination of surface water appears unlikely, however, past run-off events, the question of farm tiles and the amount of soil erosion suggest that sampling of surface waters may be warranted.

5. SOIL EXPOSURE AND AIR PATHWAYS

5.1 Physical Conditions

The area where the complaints originated and the current mixing area are not fenced. The only warning signs observed were posted on the co-op office. The ground surface is mainly soil and gravel, indicating the likelihood of considerable dust in dry weather.

In the past, customers were allowed to use the water load-out to mix farm chemicals and mishandling of chemicals was allegedly a common occurrence. Sampling of soil near the area supported those allegations (Ref.5; Ref.15). Currently, co-op personnel supervise all water load-outs and no mixing by non-emoloyees is allowed at the water load-out/containment area (Ref.31). Two small yellow stains were observed beside the containment pad during the site reconnaissance but no other obvious signs of soil contamination were observed (Ref.24).

5.2 Soil and Air Targets

The nearest residence is located directly to the east of the area where the complaints originated. In the past, These property owners complained of loss of vegetation and of health effects that they felt were caused by contamination which occurred because of activities at the neighboring co-op (Ref.5).

There are four full-time and one part time workers onsite (Ref.14).

The estimated population within a four-mile radius from the site is as follows:

Distance from site (miles)	Estimated Population (Ref.29)
0 - 1/4	202
1/4 - 1/2	162
1/2 - 1	27

1 - 2	107
2 - 3	179
3 - 4	246
Total	923

5.3 Soil and Air Pathway Conclusions

Past soil and vegetation samples supported allegations of past mishandling of chemicals at the co-op, though it should be noted that the levels of agricultural chemicals detected in the soil were below 10 ppm (Ref.15; Ref.28,p.102). Currently, some exposure threat should be considered because of the large area of bare soil with its associated run-off and dust problems.

6. SUMMARY AND CONCLUSIONS

Based on past sampling, court documents, and more recent sampling, it appears there has been a release of agricultural chemicals at this site. The documented levels of contaminants which have been detected in groundwater and soil are relatively low, however, most of the sampling locations were not ideal. Additional sampling is needed to determine the extent of contamination.

The threat of contamination to the public water supply appears remote due to the well locations and their distance from the site. The threat to private wells appears small because the area is served by the Shelby RWA, as is the City. However, it appears that groundwater has been impacted and limited information on the locations of private drinking water wells indicates the need for additional assessment. A more complete private well survey may be appropriate, pending additional groundwater and soil sample results.

The exposure threat through the suface water pathway appears small, however, past run-off events, the question of farm tiles and the amount of soil erosion suggest that sampling of surface waters during the application season is warranted.

The soil and air pathways appear to pose little threat at this time, based on the low levels which were detected in the soil, however, some exposure threat should be considered because of the large area of bare soil with its associated run-off and dust problems. Additional sampling is warranted due to the limited area where previous samples which were collected.

RECOMENDATIONS:

1. Additional groundwater samples should be collected in the areas of highest expected contamination.

2. Additional soil samples should be collected to more thoroughly screen the area.

3. Stream samples should be collected during the application season.

4. A more thorough private well survey may be needed, based on sampling results.

5. Areas of bare soil should be seeded or managed to minimize soil erosion.

REFERENCES:

1. Cal Wolter, IDNR, Geographical Information System, Utilizing MUNIWU (Municipal Water Use), WATERU (Water Use Permits) and PRIWELL Private Well Data Files, January 1993.

2. Iowa Department of Economic Development, "1991 Statistical Profile of Iowa".

3. Jim Christensen, Pesticide Investigator, Iowa Department of Agriculture (IDOA), Memo to Charles Eckermann, Supervisor, IDOA, June 15, 1987. IDNR File: Con 12-15, Farm Service Co-op, Persia.

4. James R. Mac Donald, Chief, Case Preparation and Technical Assistance Section, Letter to Darrell Lawrenson, Branch Manager, FSC, June 19, 1989. Iowa Department of Agriculture and Land Stewardship File: Farm Service Co-op, Persia.

5. Iowa District Court for Harrison County, Findings, Conclusions and Decree in Kosmacek V Farm Service Co-op, Filed August 23, 1990. Iowa Department of Agriculture and Land Stewardship File: Farm Service Co-op, Persia.

6. Jim Christensen, Pesticide Investigator, Iowa Department of Agriculture (IDOA), Conversation with Kathleen Bason, Environmental Specialist, IDNR, January 6, 1993.

7. Don Gordon, Supervisor, Water Resources Section, Iowa Geologic Survey Bureau, Conversation with Kathleen Bason, Environmental specialist, IDNR, January 7, 1993.

8. United States Dept. of Agriculture, et al., "Soil Survey of Harrison County, Iowa", 1976.

9. Geological Survey, et al., 1:100,000 scale topographic map: Harrison County, 1987.

10. Geological Survey, et al., 1:100,000 scale topographic map: Pottawatamie County, 1985.

11. IDNR Report of Investigation, Persia Municipal Water Supply, July 14, 1992. IDNR File: Persia Municipal Water Supply, PWS ID# 4360 038.

12. IDNR Water Supply Survey for Persia Municipal Water Supply, May 20, 1992. IDNR File: Persia Municipal Water Supply, PWS ID# 4360 038.

13. Terracon Environmental, Inc., "Environmental Site Assessment, Kosmecek Property, Persia, IA, Job no. 40895159". IDNR File: Con 12-15, Farm Service Co-op, Persia.

14. Darrel Lawrenson, Branch Manager, Farm Service Co-op, Telephone Conversation with Kathleen Bason, Environmental Specialist, IDNR, March-15, 1993.

15. Iowa Department of Agriculture, State Chemical Lab Report of Analysis, Samples # IA1900, IA1891, IA1892, IA1893, collected June 15, 1987. IDNR File: Con 12-15, Farm Service Co-op, Persia.

16. Iowa Department of Agriculture, State Chemical Lab Report of Analysis, Sample no. IA2237, collected June 10, 1988. IDNR File: Con 12-15, Farm Service Co-op, Persia.

17. Geological Survey, 7.5-minute topographic map of Persia, Iowa, 1978.

18. Geological Survey, 1:125,000 scale map, "Bedrock Topography of West-Central Iowa", 1986, Hansen and Runkle.

19. Geological Survey, 1:500,000 scale map, "Geologic Map of Iowa", 1969, Hershey

20. Ground water Service and Supply, Inc., "Results of an Environmental Subsurface Investigation on a Real Estate Parcel Located in Persia, Iowa for Farm Service Cooperative", February 15, 1989. IDNR File: Con 12-15, Farm Service Co-op, Persia.

21. John Fleckenstein, Environmental Specialist, IDNR Preserves and Ecological Services Bureau, Memo to Kathleen Bason, February 12, 1993. IDNR File: Con 12-15, Farm Service Co-op, Persia.

22. Groundwater Service and Supply, Inc., Well logs for MW-1, MW-2 and MW-3, Persia/Cohurst Project, 7/7/89. IDNR File: Con 12-15, Farm Service Co-op, Persia.

23. University of Iowa, Hygienic Laboratory, Analytical Report for Sample Number 8906287, Collected 7/8/89, by Groundwater Services and Supply, Inc. for Persia/Cohorst project. IDNR File: Con 12-15, Farm Service Co-op, Persia.

24. Kathleen Bason, Environmental Specialist, IDNR, Field Logbook, March 23, 1992. IDNR File: Con 12-15, Farm Service Co-op, Persia.

25. Lowell Clark, Harrison County Sanitarian, Phone discussion with Kathleen Bason, Environmental Specialist, IDNR, March 15, 1993.

26. Department of Housing and Urban development, Federal Insurance Administration, Town of Persia Flood Hazard Boundary Map, December 13, 1974. IDNR File: Con 3-4-1-3, Flood Insurance Correspondence, Persia.

27. Charles Becker, Atty for Farm Service Co-op, Phone Conversation with Kathleen Bason, Environmental Specialist, IDNR, March 17, 1993.

28. West's North Western Reporter, second series, 485 N.W. 2d, July 28, 1992, No.2.

29. Cal Wolter using GIS to access 1990 U.S. Census Bureau Population Data.

30. Office of Water, U.S. Environmental Protection Agency, "Drinking Water Regulations and Health Advisories", December 1992.

31. Charles Becker, Atty for Farm Service Co-op, Phone Conversation with Kathleen Bason, IDNR, April 6, 1993.