FINAL

SECOND FIVE-YEAR REVIEW REPORT

At Former Defense Fuel Supply Point Site
Installation Restoration Program Site OT013
Escanaba, Michigan

April 8, 2020

Prepared by

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LIST OF ABBREVIATIONS & ACRONYMS

AFB	Air Force Base
AFCEE	Air Force Center for Engineering Excellence
AFCEC	Air Force Civil Engineer Center
AFFF	Aqueous Film Forming Foam
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Aboveground Storage Tank
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
DAA	Detailed Analysis of Alternatives
DFSP	Defense Fuel Supply Point
EGLE	Michigan Environment, Great Lake, and Energy
EPA	United States Environmental Protection Agency
FESL	Flammability/Explosivity Screening Level
FYR	Five-Year Review
GSI	Groundwater-Surface Water Interface
HNV	Human Noncancer Value
ICs	Institutional Controls
IRAP	Interim Remedial Action Plan
LUC	Land Use Control
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
PAH	Polycyclic Aromatic Hydrocarbon
PFAS	Per- and Poly-fluoroalkyl Substances
PFOA	Perflourooctanoic acid
PFOS	Perfluorooctanesulfonic acid
RAO	Remedial Action Objectives
RRD	Remediation and Redevelopment Division
SVE	Soil Vapor Extraction
SVOC	Semi-volatile Organic Compound
VOC	Volatile Organic Compound
UU/UE	Unlimited Use and Unrestricted Exposure

I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The Air Force Civil Engineer Center (AFCEC) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan, also known as the National Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] §300.430(f)(4)(ii)), Comprehensive Five-Year Review Guidance (EPA, June 2001) and considering Air Force policy (Air Force Instruction 32-7020). This Five-Year Review (CDRL A001C) follows the EPA recommended Five-Year Review Template (EPA, January 2016).

This is the second FYR for the former Defense Fuel Supply Point (DFSP) Site in Escanaba, Michigan, further referred to as "Escanaba". The triggering action for this **policy-driven** review is the signature date of the Interim Response Activity Plan Closure Report for DFSP, dated March 2007, and signed by the Air Force on May 3 2007. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Escanaba Site Five-Year Review was led by Kay Grosinske and AFCEC. Participants included Sabina Chowdhury, Booz Allen Hamilton technical lead; Robert Zuiss, SpecPro Services contract support, Mark Petrie, state agency representative; Paul Walz, Bay West technical assistance, and Ken Brown, AECOM technical assistance. The review began on October 1, 2018.

Site Background

Escanaba was a JP-4 jet fuel storage and distribution depot for the former K.I. Sawyer Air Force Base (AFB) located in Gwinn, Michigan. The property is currently owned by the Hannahville Indian Community of Wilson, Michigan. Soil and groundwater at Escanaba and neighboring properties were impacted by fuel releases from USAF operations and previous historical industrial operations that included the generation of wood tar waste. Escanaba and K.I. Sawyer AFB site locations are shown in Figure 1. The Escanaba site location is also shown in Figure 2.

This is the second five-year review to be conducted for Escanaba following completion of remedial activities included in the decision document Interim Remedial Action Plan (IRAP) Closure Report, DFSP Escanaba, Michigan (2007). The remedial activities selected in the IRAP were based on treating much of the source material and providing safe management of the remaining material. The USAF evaluated a range of Remedial Action alternatives for Escanaba. The evaluation results were reported in the Detailed Analysis of Alternatives (DAA) Report (Earth Tech, 2001). The DAA Report is the Feasibility Study. This five-year review includes all site activities conducted at Escanaba during the period November 2013 through November 2018.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Former Defense Fuel Supply Point Escanaba Site, Installation Restoration Program Site OT013		
EPA ID: MI2971590003 (SEMS EPA ID) or 110013733068 (EPA Registry ID)		
Region: 5	**State:** MI	**City/County:** Escanaba/Delta

SITE STATUS	
NPL Status: Non-NPL	
Multiple OUs? No	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: Other Federal Agency ***[If "Other Federal Agency", enter Agency name]*:** U.S. Air Force
Author name (Federal or State Project Manager): Ms. Kay M. Grosinske
Author affiliation: Air Force Civil Engineer Center (AFCEC)
Review period: November 1, 2013 – November 1, 2018
Date of site inspection: 10/11/2018
Type of review: Policy
Review number: 2
Triggering action date: 3 May 2007, in 2007 Interim Response Activity Plan Closure Report
Due date *(five years after triggering action date)*: May 2017

Declaration Statement

Based on the results of this Second Five-Year Review for Former Defense Fuel Supply Point Site IRP Site OT013 completed May 2019, it is concluded that the remedies for all sites are currently protective of human health and the environment and all immediate threats to human health and the environment have been addressed.

U.S. AIR FORCE

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Dr. Stephen TerMaath **Date**
BRAC Division Chief
Installations Directorate Air Force Civil Engineer Center

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

- The response action at Escanaba was taken after discovering soil and groundwater contamination exceeding regulatory criteria. The action was taken to prevent further migration of fuel-related contamination towards Little Bay De Noc (Lake Michigan), and restrict groundwater use and construction at Escanaba.
- The Escanaba site and surrounding areas were impacted from past industrial operations in the form of wood tar waste and iron foundry slag deposits. Soil and groundwater sampling results indicated that metals concentrations were elevated above naturally occurring levels in some areas, most likely as a result of past industrial operations.
- Fuel-related chemicals were present in soil and groundwater at concentrations exceeding regulatory criteria over a portion of Escanaba. The presence of these chemicals is related solely to Escanaba operations in some areas and to a combination of Escanaba and past industrial operations in other areas.
- Groundwater samples collected in 1990, 1994, and 1995 had detectable concentrations of volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs) and metals. Subsequent investigations indicated that groundwater at the site was impacted with VOCs, semi-volatile organic carbons (SVOCs), methane, and metals.

Response Actions

The remedy selected by the Air Force was intended to provide for limited nonresidential development of Escanaba with restrictions on groundwater use and on construction to protect the aquitard beneath the site and slurry wall surrounding the site. The restrictions also require that any buildings located where groundwater criteria for Protection of Indoor Air Inhalation are exceeded be designed with engineering controls to prevent migration of contaminants to the building air.

The selected remedy included a combination of treatment and excavation/off-site disposal for source control, natural attenuation to decrease concentrations of organic contaminants in groundwater, groundwater extraction and treatment to control seeps to prevent surface discharge of groundwater, and land use controls (LUC). The source area treatment included biosparging/soil vapor extraction (SVE), designed to remediate both soil and groundwater at the source areas inside and adjacent to the slurry wall.

The remedial action objectives (RAOs) consist of medium-specific goals for protecting human health and the environment. The RAOs developed for this site consider the contaminants of concern, exposure scenarios, and the concentration or range of concentrations for each exposure route. Act 451, Part 201 Regulations dated December 21, 2002, lists Generic Cleanup Criteria based on exposure pathways. The chemical-specific cleanup criteria concentrations are considered appropriate unless there are site-specific conditions that significantly differ from conditions on which the generic criteria are based. The Remedial Action Objectives (RAOs) for groundwater at this site were based on mixing-zone based site-specific chronic groundwater-surface water interface (GSI) criteria.

Surface water in ditches on the site was impacted by surface discharge of groundwater. Based on this data the following specific exposure pathway concerns were identified:

- Direct contact with viscous wood tar waste deposits in soil.
- Migration of contaminants from soil to groundwater.
- Ecological receptors exposed to venting groundwater at groundwater/surface water interface (GSI) near Lake Michigan.
- Human receptors using surface water near site as a drinking water source in future.
- Ingestion of groundwater containing BTEX, VOCs, SVOCs, and metals.
- Indoor air inhalation of VOCs volatilizing from groundwater into structures constructed at site.

- Direct contact with BTEX and lead-impacted soil.
- Flammability and explosivity hazard for methane in groundwater

The chemical-specific RAOs are the Michigan Environment, Great Lakes, and Energy (EGLE) Part 201 Generic Cleanup Criteria except for the GSI criteria. Cleanup criteria are dependent on exposure pathway. The most restrictive criteria are the RAO unless the exposure pathway associated with those criteria is controlled by land use restriction or other institutional controls. RAOs for groundwater are listed in the table below, respectively, and consist of groundwater-surface water interface criteria and groundwater vapor intrusion criteria. The RAO for wood tar waste is removal of the visually obvious deposits. The deposits pose a potential direct contact risk and may leach contaminants to groundwater. Wood tar waste has been removed from the Escanaba facility.

Constituent of Concern (µg/L)	**Industrial Drinking Water Protection Criteria**	**Groundwater Surface Water Interface Criteria Chronic Value**	**Groundwater Surface Water Interface Criteria Acute Value**
Benzene	5	130*	1,800*
Ethylbenzene	74	200*	320*
Toluene	790	1,500*	1,700*
Xylenes	280	390*	630*
1,2,4-Trimethylbenzene	63	190*	310
1,3,5-Trimethylbenzene	72	500*	810*

* Mixing Zone Based Groundwater Surface Water Interface (GSI) Criteria.

A new group of contaminants, Per- and Polyfluoroalkyl substances (PFAS), have been identified in groundwater and surface water at the site since the remedy was implemented. These compounds were not included in the RAOs.

Status of Implementation

A Final IRAP Closure Report (Air Force, 2007) was prepared and implemented to address impacts at Escanaba. Remedial actions completed to date are included in the following sections.

Slurry Wall

The slurry wall that surrounds the former aboveground storage tank (AST) farm was constructed in 1983 and 1984 to prevent off-site migration of jet fuel if a release from a tank(s) were to occur. Two sections of eastern slurry wall were purposely breached (removed) during supplemental excavation activities conducted during July and October 2008.

Soil Excavation

Between September 2002 and January 2003 an excavation with off-site disposal was conducted to address wood tar waste deposits and wood tar-, lead-, and fuel-contaminated soil from areas inside and outside the slurry wall at Escanaba. A total of approximately 48,350 tons of wood tar waste, wood tar-, lead- and fuel- contaminated soil were excavated and disposed. During 2004, an excavation (71 tons) with off-site disposal was conducted to address lead-contaminated soil from Escanaba.

During July and October 2008, a supplemental excavation with off-site disposal was conducted to address residual wood tar waste deposits and fuel and lead-contaminated soil from five “hot spots”. A total of approximately 1,860 tons of fuel-contaminated soil were excavated and disposed of at the Delta County Landfill. A total of approximately 1,095 tons of wood tar waste and fuel-contaminated soil were excavated and disposed of at the Delta County Landfill.

An approximate 70-linear foot section of the east slurry wall adjacent to Private Property 1 (See Figure 3) was removed to a depth of about 8 to 10 feet bgs during supplemental excavation activities conducted in July and October 2008 to remove several residual areas of impacted soil.

Remedial Systems
A biosparge system, designed to treat fuel-contaminated source areas inside and adjacent to the slurry wall, was installed at Escanaba and operated between February 2005 and November 2007. The biosparge system consisted of 36 biosparge injection wells (Figure 5). The biosparge wells/system was abandoned in 2012.

Groundwater seep control and treated water reinjection systems were installed at Escanaba. The systems were designed to eliminate the contaminant exposure pathway at two seep locations located inside slurry wall and to lower the water table, allowing the biosparge system to be more effective. The groundwater seep control and treated water reinjection systems operated as designed during the period September 2004 through July 2008. The groundwater seep control and treated water reinjection systems were abandoned in 2012.

An original and subsequent temporary SVE system, designed to treat fuel-contaminated source areas inside and outside the slurry wall, was installed at Escanaba. The original SVE system operated as designed during the period February 2005 through September 2006. The temporary SVE system operated during the period October 2006 through July 2008. The original SVE system was abandoned in 2012. The temporary SVE wells were removed (abandoned) in 2008 because they were in footprint of the supplemental contaminated soil excavation. Figure 4 depicts the soil excavation areas and the former remediation and monitoring well locations.

Natural Attenuation
Natural attenuation was the selected remedy for fuel-related contaminants in groundwater. The Environmental Protection Agency (EPA) and EGLE agreed that the USAF would not be required to conduct response activities to address metals, acetic acid, and formaldehyde in groundwater at Escanaba. Natural attenuation has met RAOs in groundwater for selected contaminants of concern (COCs) and groundwater monitoring is no longer being monitored. The last groundwater sampling event was conducted in March 2010.

Groundwater Monitoring
Phase 1 monitoring began with the second quarter of 2004 and was completed with the May 2006 monitoring event. Phase 2 monitoring began with the July 2006 monitoring event and was completed with the October 2008 monitoring event. The Hannahville Indian Community was responsible for conducting Phase 3 groundwater sampling. Phase 3 monitoring, conducted at Escanaba included events in April, July, and October 2009, and March 2010. These wells were subsequently abandoned in September 2012 after EGLE agreed that monitoring was no longer required (Figure 5).

Land Use Controls and Restrictions
LUCs have been implemented through deed restrictions at the time the property was transferred to the current owner: the Hannahville Indian Community. The LUCs were authorized by the Air Force and entered into record by the Delta County Register of Deeds on June 19, 2007.

LUCs were put in place to:

- Restrict use of the site to limited nonresidential;
- Restrict use of shallow groundwater;
- Require special construction in aquitard beneath Escanaba;
- Require engineering controls for any new building construction due to groundwater and/or indoor air volatilization of VOCs and/or flammability and explosion concerns from methane; and
- Require placement and maintenance of permanent markers, as long as protection of slurry wall is required.

In 2014, MDEQ requested the Air Force place LUCs on two neighboring properties to restrict groundwater use and construction in the aquitard, where the upper water-bearing unit is impacted by petroleum (benzene, ethylbenzene, toluene, and xylene [BETX]) contaminants (MDEQ 2014). The last groundwater data from 2010 indicated that BETX were still present in neighboring property monitoring wells at concentrations exceeding residential drinking water criteria (Hannahville 2010). Methane-impacted groundwater exceeded the flammability

and explosive screening level of 520 mg/L, which was used as the RAO for the Interim Remedial Action Plan (IRAP) on both adjacent private properties.

These LUCs will not be implemented as requested for several reasons.

- In 2012 and 2013, MDEQ conducted a soil gas investigation for methane gas and the results did not identify methane in soil vapor.
- A change in the methane in groundwater criteria was promulgated by the State of Michigan late in 2013. The change resulted in an increase in the flammability/explosivity screening level (FESL) for methane from 520 µg/L to 28,000 µg/L. Due to this increase, the methane concentrations detected in groundwater samples collected during the Phase 3 sampling events no longer exceed criteria in the most recent samples (2010).
- The 2007 IRAP did not include LUCs for the neighboring properties. If a five-year review reveals that LUCs are necessary to ensure protectiveness at a site but were not selected as part of the original remedy, modification of the decision document generally would be appropriate. As discussed above, methane concentrations no longer exceed screening levels, but based on the last groundwater data collected, BETX contaminants remain in groundwater under neighboring properties, and LUCs are necessary to help ensure protectiveness. AFCEC tried to engage the neighboring properties in negotiations to get them to place LUCs on their properties, but the efforts resulted in no agreements.
- Implementability is also a critical factor in remedy selection, and the failure of negotiations concerning financial compensation with one of the owners precludes any progress towards fulfilling this request.

One alternative solution could be to issue deed notices, in consultation with EGLE, to notify current and future property owners of restrictions that have been recommended to ensure long-term protectiveness.

LUC Summary Table

Table 1: Summary of Planned and/or Implemented LUCs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	LUCs Called for in the Decision Documents	Impacted Parcel(s)	LUC Objective	Title of LUC Instrument Implemented and Date (or planned)
Entire Site	Yes	Hannahville Indian Community Property	Restrict use of the site to limited nonresidential	Declaration of Restrictive Covenants, June 2007
Groundwater	Yes	Hannahville Indian Community Property	Restrict use of shallow groundwater; Require special construction in aquitard beneath DFSP	Declaration of Restrictive Covenants, June 2007
Entire Site	Yes	Hannahville Indian Community Property	Require engineering controls for any new building construction due to groundwater and/or indoor air volatilization of VOCs and/or flammability and explosion concerns from methane (methane is no longer a concern)	Declaration of Restrictive Covenants, June 2007
Former Slurry Walls	Yes	Hannahville Indian Community Property	Require placement and maintenance of permanent markers, as long as protection of slurry wall is required	Declaration of Restrictive Covenants, June 2007

The current condition of the Escanaba site is vacant and undeveloped, with former aboveground tanks removed. The site is surrounded by a fence and access is restricted by a locked gate. The ground surface is well vegetated, including areas that were subject to past soil removal actions. Monitoring and remedial wells and remedial system components have been abandoned and removed from the site. The slurry wall was breached to allow groundwater flow from the former AST area. Four small buildings remain on the property, two former remedial system buildings and two former Escanaba buildings. Based on discussions with Hannahville Indian Community representatives, no specific plans for redevelopment of the site have been formalized.

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the **last** five-year review as well as the recommendations from the **last** five-year review and the current status of those recommendations.

Table 2: Protectiveness Determinations/Statements from the 2013 FYR

Site	Protectiveness Determination	Protectiveness Statement
Escanaba	Will be Protective	All remedial actions in the IRAP have been completed, with the exception of the implementation of LUC/ICs on the neighboring properties, and groundwater monitoring has been discontinued with MDEQ consent. Although LUC/ICs required by the decision documents have not been implemented on the neighboring properties, the selected remedy is protective of human health and the environment in the short-term since there are no exposures occurring. However, future exposures could occur without LUC/ICs on the neighboring properties, so the implemented remedy is not protective in the long-term. A No Further Action Determination should be prepared for submittal to the MDEQ requesting limited nonresidential restricted site closure.

Table 3: Status of Recommendations from the 2013 FYR

OU #	Issue	Recommendations	Current Implementation Status Description	Completion Date (if applicable)
Site-wide	The selected remedy, not included as part of the IRAP, included placement of LUCs on surrounding property, where the upper water-bearing unit is affected by contaminants from the site to restrict groundwater use and restrict construction in the aquitard beneath the site. These restrictions have not yet been placed on the two adjacent private property deeds.	Place LUCs on two adjacent private property deeds to restrict groundwater use and restrict construction in the aquitard.	LUCs may not be placed if they are not part of the remedy as stated in the decision document. An amended remedy is not possible based on failed negations with neighboring property owners. The driver for LUCs was methane, which is no longer a concern. New recommendations are presented in Section VI.	Not applicable

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A public notice was made available by publishing in the Escanaba Daily Press titled "CERCLA Five Year Review Announced", on October 27, 2018, stating that a five-year review is being conducted and inviting the public to submit any comments to AFCEC. The results of the review and the report will be made available at the Site information repository located at U.S. Air Force Civil Engineer Center Administrative Record located at http://afcec.publicadmin-record.us.af.mil/Search.aspx.

During the site inspection, Mr. Jesse Viau, attorney for the Hannahville Indian Community, was interviewed to document any perceived problems or successes with the remedy that has been implemented to date**.** A summary of the interview is provided in the Site Inspection section below.

Data Review

No samples were collected during this five-year review period other than for PFAS, discussed later in Section V.

Beginning in 2012, EGLE collected soil vapor samples in and around Private Property 1 dwelling to evaluate whether methane present in nearby monitoring wells was partitioning from groundwater to the vadose zone and migrating to the inhabited building. Soil vapor samples were collected from probes installed through the concrete floor of the basement in the Private Property 1 dwelling and through the concrete floor of the garage. Laboratory results indicated that methane was not detected at any of the probe locations during three sampling events (October 2012, January 2013, and April 2013). Additional soil probes were installed at locations outside of the Private Property 1 dwelling in 2013, and results indicated no detections of methane in soil vapor. No further investigations of methane are required by EGLE.

Site Inspection

The inspection of the Site was conducted on October 11, 2018. In attendance were Ms. Kay Grosinske (AFCEC), Mr. Mark Petrie (DEQ), Mr. Jesse Viau of the Hannahville Indian Community (current site owner), Mr. Rory Mattson of the Delta County Conservations District, Ms. Sarah Schneider and Mr. Andrew Smith of Wood Environment and Infrastructure Solutions, consultants for AFCEC per-and poly-fluoroalkyl (PFAS)-related investigations at the site, and Mr. Ken Brown of AECOM. The purpose of the inspection was to assess the protectiveness of the remedy.

The inspection team walked the site and discussed the land use restrictions placed on the property. Several questions were asked by Mr. Viau about the integrity of the fence and whether it was necessary to keep it in place. Mr. Petrie generally answered that the fence and security is needed until the site is occupied consistently. The site was in good condition and no major issues were identified. The sign was in good condition. The fence was in good condition, but there was a gap in the south portion of the site and two gaps along the adjacent private property. These were not considered breeches as they were purposely made to allow deer to escape the site. Vandalism was present in all of the remaining buildings. Typical vandalism included broken windows, doors, and interior equipment.

The grounds of the site have not been developed or changed since the last five-year review. Vegetation was in good condition, with no bare or stained areas observed. The use of the site remains un-developed, but discussions with the current owner indicated that plans are progressing to develop the property in the future.

Mr. Brown asked Mr. Viau if he was aware if the Hannahville Indian Community or the local community had any concerns related to the environmental remedy in place at the Escanaba site. Mr. Viau answered that no concerns have been observed or reported to the Hannahville Indian Community about the site. Mr. Viau indicated that the Hannahville Indian Community is considering completion of an economic development study of the Escanaba and neighboring sites in the near future.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

The review of documents, ARARs, risk assumptions, and the results of the site inspection indicates that the remedy is functioning as intended by the IRAP. The remedy at Escanaba was implemented to address the presence of JP-4 and wood tar waste in soil and BTEX, VOCs, and methane in groundwater. The remedy included soil sampling, excavation and off-site disposal of contaminated soil, biosparge/SVE of source areas, installation of a seep control system, natural attenuation, and groundwater monitoring.

COC concentrations remained below the chronic GSI cleanup criteria for the average of the GSI wells and below the acute GSI cleanup criteria at all of the Phase 3 wells during the four sampling events conducted under the Phase 3 monitoring. In accordance with the IRAP, all groundwater monitoring at the site ceased following the final monitoring event conducted in March 2010. General concentration declines were attributed to contaminant mass removal by excavation and natural attenuation, with secondary reductions achieved through the groundwater extraction and treatment biosparge systems.

LUCs were placed on the site to restrict the use of the property to limited nonresidential, restrict the use of the shallow groundwater, require special construction in the aquitard beneath the site, protect portions of the existing slurry wall, require engineering controls for new construction in Area 1 (Figure 3), and require placement and maintenance of permanent markers for protection of the slurry wall. LUCs for the site are recorded with the Delta County Recorder's office on the property deed. Continued implementation of the LUCs is the responsibility of the Hannahville Indian Community.

All components of the remedy are functioning as intended.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Question B Summary:

The flammability and explosive screening level for methane-impacted groundwater of 520 mg/L, which was used as the RAO for the Interim Remedial Action Plan (IRAP) on both adjacent private properties, is no longer valid; a 2013 promulgated change in the methane in groundwater criteria (520 µg/L to 28,000 µg/L) eliminated methane as a COC (discussed below). All other exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection are still valid.

The chemical-specific cleanup levels at Escanaba are the most restrictive of the relevant criteria under EGLE Act 451 Part 201 Generic Cleanup Criteria and site-specific GSI criteria for both soils and groundwater. MDEQ (now EGLE) developed the mixing-zone based site-specific GSI criteria for groundwater from surface water human drinking water value (HDV) because site groundwater discharges to to Lake Michigan, which is protected as a drinking water source. The cleanup criteria for soil are the site-specific groundwater GSI criteria multiplied by 20.

In 2018, the State of Michigan adopted several revisions to Part 201 Cleanup Criteria. Among the relevant COCs for Escanaba, the drinking water criteria were lowered for ethylbenzene, toluene, xylenes, 1,2,4 and 1,3,5 trimethylbenzene. These criteria are not applicable, however, at Escanaba as the drinking water pathway is restricted through LUCs. The HDV values, which were used in developing the site-specific GSI criteria, have not been revised. Therefore, all applicable cleanup criteria for Escanaba are still valid.

A 2013 promulgated change in the methane in groundwater criteria (520 µg/L to 28,000 µg/L) eliminated methane as a COC. A comparison of the Phase 3 sample methane results and the new FESL is provided below.

Table 4: 2013 Methane Sample Results and Revised Criteria

Contaminant	Well No.	Revised Flammability & Explosivity Screening Level (µg/L)	Concentration in µg/L			
			4/2009	7/2009	10/2009	3/2010
Methane	GSI-9	**28,000**	**23,000**	**19,000**	**29,000**	**19,000**
	RFW-9		**18,000**	980	1,900	**19,000**
	RFW-10		**18,000**	**19,000**	**26,000**	**8,100**
	BS-5		ns	ns	ns	**13,000**
	RFW-5		ns	ns	ns	**25,000**
	RFW-7		ns	ns	ns	**26,000**

Note: µg/L – micrograms per liter

QUESTION C: Has any **other** information come to light that could call into question the protectiveness of the remedy?

There have been no changes at the site (e.g., new contaminant sources, new ecological risks) which would inhibit this remedy's protectiveness.

Since the previous Five-Year Review, an investigation into an emerging class of contaminants, perfluorooctane sulfonate and perfluorooctanoic acid (PFOS/PFOA) has been conducted at Escanaba. PFOS/PFOA are found in aqueous film forming foam (AFFF) that was historically used by the AF, as well as general and widespread use by industry, to fight fires. The investigation included soil, groundwater, surface water, and sediment sampling in 2015 and 2016 to determine if PFOS/PFOA are present. Sampling conducted in late 2015 identified PFOS and PFOA at concentrations exceeding the EPA Lifetime Health Advisory for drinking water and Michigan Drinking Water Cleanup Criteria (0.07 µg/L for PFOS and PFOA, when found individually or in combined concentrations) in groundwater at three release areas. Subsequent sampling of seven nearby residential drinking water wells from December 2015 to March 2016 confirmed there is currently no unacceptable exposure through the drinking water pathway. Surface water and sediment were sampled in Little Bay de Noc in spring 2017. PFOS was detected in Little Bay de Noc at concentrations exceeding the Michigan Human Noncancer Value (HNV) for surface water used as a drinking water source. PFOA was detected in Little Bay de Noc at concentrations below the Michigan HNV. PFOS and PFOA will be further addressed through an RI and, ultimately a new Decision Document, following the same CERCLA process as established for other contaminants. The Final Site Inspection Report (June 2018) contains details of the investigation conducted at Escanaba.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) with Issues/Recommendations Identified in the Five-Year Review:
The selected remedy, not included as part of the IRAP, included placement of LUCs on surrounding property, where the upper water-bearing unit is affected by contaminants from the site to restrict groundwater use and restrict construction in the aquitard beneath the site. These restrictions have not yet been placed on the adjacent private property deeds.

Issues and Recommendations Identified in the Five-Year Review:

OU:	**Issue Category:** Land use controls			
	Issue: Change in promulgated methane in groundwater criteria eliminated methane as a COC. However, surrounding properties do not meet levels suitable for UU/UE due to other COCs.			
	Recommendation: Deed notices, in consultation with EGLE, to notify current and future property owners of restrictions that have been recommended will ensure long-term protectiveness.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
N/A	N/A	N/A	N/A	N/A

In addition, the following are recommendations that were identified during the FYR and (may improve performance of the remedy, but do not affect current and/or future protectiveness:

- Continue periodic communication with the Hannahville Indian Community. Since they are considering redevelopment of the site, more frequent communication will allow planning and information transfer to ensure future development meets LUC requirements.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)		
Operable Unit:	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* N/A
Protectiveness Statement: The remedy at Escanaba for COCs addressed in the 2007 IRAP, is protective of the current designated use for limited nonresidential purposes, and LUCs are in place on the Escanaba property. LUCs cannot be implemented on the neighboring properties; however, neighboring property owners have been notified of their responsibilities, and this part of the remedy is short-term protective. Deed notices, in consultation with EGLE, to notify current and future property owners of restrictions that have been recommended will ensure long-term protectiveness for BETX contaminants in groundwater. Escanaba was characterized by BTEX and VOCs, which exceeded the cleanup criteria in groundwater. The remedy included VOC contaminant mass removal, groundwater monitoring, natural attenuation, and LUCs. All remedial actions pertaining to COCs addressed in the 2007 IRAP at the site have been completed and groundwater monitoring has been discontinued with EGLE consent. COCs in groundwater have met the restricted use criteria in accordance with the IRAP, but remain above Part 201 residential drinking water criteria. Land and groundwater use restrictions control applicable exposure pathways on the Escanaba property.		

VIII. NEXT REVIEW

The initial trigger action for the former Escanaba site was completion and signature of the decision document (2007 Interim Response Activity Plan Closure dated March 2007 and signed on May 3, 2007. In accordance with AFI 32-7020, each subsequent five-year review must use the start of the initial remedial action as the trigger date. Therefore, the completion date for the third five-year review will be May 3, 2022.

FIGURES

Notes: Larger image taken from Google Earth Pro, dated June 7, 2014.
Inset image from Google Earth Pro, dated 10/10/2013

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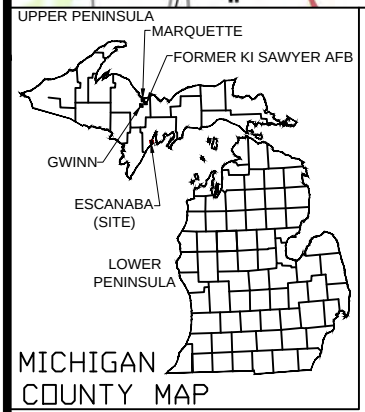
Second Five-Year Review
DFSP, Escanaba, Michigan

LOCATION MAP

Project Number:	Drawn By:	Date:	Figure No. 1
60516415	JSM	10/24/2018	

File: \\srmwk1fs001\prod\Data\Projects\60516415\500_Deliverables\Sawyer AFB\2018 Escanaba 5YR\Report\Figures\CAD\FIGURE1_LOCATION_MAP_2018.dwg; USER: MACKINNEY, JOEL; PLOTTED:October 24, 2018 - 2:59 PM



SOURCE: USGS 7.5 MINUTE QUADRANGLE, GLADSTONE, MICHIGAN, 2017

3000 4000 5000 6000
FEET

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Second Five-Year Review
DFSP, Escanaba, Michigan

DFSP SITE LOCATION MAP

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Project Number: 60516415 | Drawn By: JSM | Date: 10/24/2018 | Figure No. 2

IMAGE SOURCE: GOOGLE MAPS, DATED 10/10/2013

LEGEND

- PROPERTY BOUNDARY
- HISTORIC HIGH WATER LINE
- AREA 1
- AREA 2

N

0' 100' 200' 400'

SCALE: 1" = 200'

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SECOND FIVE-YEAR REVIEW
DFSP, ESCANABA, MICHIGAN

LAND USE RESTRICTION BOUNDARIES

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Project Number: 60516415 | Drawn By: JSM | Date: 10/23/2018 | Figure: 3

File: \\usmwk1fs001\prod\Data\Projects\60516415\500_Deliverables\Sawyer AFB\2018 Escanaba 5YRReport\Figures\CAD\FIGURE3_GROUNDWATER_LAND_USE_oct2018.dwg; USER: MACKINNEY, JOEL; PLOTTED:February 7, 2019 - 9:55 AM

LEGEND

- WOOD TAR WASTE EXCAVATION AREA (MDEQ, 2000)
- WT-1 — AREA EXCAVATED IN 2002
- ESTIMATED HISTORIC HIGH WATER LINE
- F-8 — FUEL IMPACTED AREA
- APPROXIMATE SITE BOUNDARY

N

0' 100' 200' 400'

SCALE: 1" = 200'

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SECOND FIVE-YEAR REVIEW
DFSP, ESCANABA, MICHIGAN

SOIL EXCAVATION AREAS

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Project Number: 60516415 | Drawn By: JSM | Date: 10/24/2018

Figure: 4

PRIVATE PROPERTY 3

PRIVATE PROPERTY 3

ACCESS ROAD

30 FOOT EASEMENT

15 FOOT EASEMENT

LITTLE BAY DE NOC

MW-1

BS-2

HANNAHVILLE INDIAN COMMUNITY PROPERTY

GSI-12

RFW-11

RFW-10

Historic High Water Line

MW-12

BIOSPARGE SYSTEM INFRASTRUCTURE

PRIVATE PROPERTY 1

GSI-11

RFW-5

RFW-6

RFW-9

BS-5

BS-3

BS-7

GSI-10

BS-6

RFW-8

RFW-7

BIOSPARGE SYSTEM INFRASTRUCTURE

MW-8

ACCESS ROAD

GSI-9

MW-5

BS-8

SUMP 1

SUMP 2

GSI-8

SEEP CONTROL TRENCH

GSI-7

SUMP 4

GSI-6

SEEP CONTROL TRENCH

GSI-5

MW-4

GSI-4

BIOSPARGE SYSTEM INFRASTRUCTURE

SUMP 3

GSI-3

BS-1

BS-4

MW-15

GSI-2

LITTLE BAY DE NOC

MW-13

MW-6

RFW-1

GSI-1

MW-24

PRIVATE PROPERTY 2

IMAGE SOURCE: GOOGLE MAPS

LEGEND

- PROPERTY BOUNDARY
- SLURRY WALL
- HISTORIC HIGH WATER LINE
- GSI-2 — FORMER LOCATION OF GSI MONITORING WELL
- RFW-8 — FORMER LOCATION OF MDEQ WELL ON PRIVATE PROPERTY
- MW-3 — FORMER LOCATION OF CONVENTIONAL MONITORING WELL INSTALLED AT WATER TABLE
- MW-12 — FORMER LOCATION OF MULTI-PORT MONITORING WELL
- BS-1 — FORMER LOCATION OF MULTI-PORT BIOSPARGE MONITORING WELL
- APPROXIMATE FORMER LOCATION OF GROUNDWATER SEEPS

NOTE:
ALL BIOSPARGE AND MONITORING WELLS WERE ABANDONED IN 2012

N

0' 100' 200' 400'

SCALE: 1" = 200'

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SECOND FIVE-YEAR REVIEW
DFSP, ESCANABA, MICHIGAN

FORMER BIOSPARGE & MONITORING WELL LOCATIONS

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Project Number: 60516415 | Drawn By: JSM | Date: 10/24/2018

Figure: 5

ANSI D 22" x 34"
Approved:
Checked:
Designer:
Project Management Initials:
Last saved by: JOEL.MACKINNEY (2019-02-07) Last Plotted: 2019-02-07
Filename: \\USMWK1FS001\PROD\DATA\PROJECTS\60516415\50_DELIVERABLES\SAWYER AFB\2018 ESCANABA 5YRIREPORT\FIGURES\CAD\FIGURES_DRAFT_WELL_LOCATION_OCT2018.DWG

APPENDIX A – REFERENCE LIST

This Five-Year Review consisted of a review of the documents listed below. These documents also serve as the list of references for this report.

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APPENDIX B INSPECTION PHOTOLOG

Former secondary containment berm, facing northwest

Former laboratory building and other structures, facing east.
Fence is in interior of site, not for security.

From pier, facing southwest