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Phil Strobel, NEPA Program Director
Matt Hubner, NEPA Program
Environmental Protection Agency
NEPA Compliance and Review Program
U.S. EPA, Region 8, 8EPR-N
1595 Wynkoop Street
Denver, CO 80202-1129
Via email:
Strobel.Philip@epa.gov
Hubner.Matt@epa.gov

RE: Draft Environmental Impact Statement for the Enefit American Oil Utility Corridor Project.

Dear Mr. Strobel and Mr. Hubner,

Thank you for meeting with us last week to discuss the Draft Environmental Impact Statement (EIS) for the Enefit American Oil (Enefit) Utility Corridor Project, DOI-BLM-UT-G010-2014-0007-EIS (Utility Corridor DEIS). We appreciate your time, and attention to this issue.

Per our discussion, the undersigned organizations are writing to reiterate several concerns about the ongoing National Environmental Policy Act (NEPA) process for Enefit right-of-way applications. This utility corridor will enable Enefit's large scale oil shale strip mine and a 50,000 barrel per day retort operation in northeastern Utah, called the "South Project," on the Utah-Colorado border and nearby both the Green and White rivers.

If successful, Enefit's South Project will be the first commercial scale oil shale operation in the United States; thus, it is very important that the Bureau of Land Management (BLM) completes a meaningful analysis of environmental impacts – including water use, emissions, a greenhouse gas inventory, and species analysis – as part of its obligations under federal environmental laws.

We are deeply concerned that BLM has side-stepped around its obligation to take a hard look at the reasonably foreseeable impacts of the South Project in its draft environmental impact statement. We urge the Environmental Protection Agency (EPA), as a cooperating agency in the DEIS process and a primary regulator given the projects location in Indian Country, to carefully consider the following issues.

I. NEPA Requires Reasonable Forecasting

In the draft EIS, BLM did not analyze the potential impacts of Enefit's South Project on the environment. Part of the stated reason for this omission is because Enefit has refused to provide a plan of development for its oil shale mining and retort operation. Enefit has withheld this information based on a claim that it cannot determine the technology to be deployed until BLM makes a decision about the right-of-way. Utility Corridor DEIS at ES-2. Enefit's public statements and applications to BLM indicate that it will operate the South Project regardless of whether the right-of-way is granted. Utility Corridor DEIS at ES-2. And Enefit states that it plans

to construct a proven retort technology called Enefit280 on the South Project property as part of its Utah operations. Enefit American Oil, RD&D Development Plan, July 19, 2012 at 10-11.

As you are aware, NEPA obligates reasonable forecasting. In discussing this obligation, courts have found that "the agency need not speculate about all conceivable impacts, but it must evaluate the reasonably foreseeable significant effects of the proposed action." *Sierra Club v. Marsh*, 976 F.2d 763, 767 (1st Cir. 1992). In this context, reasonable foreseeability means that "the impact is sufficiently likely to occur that a person of ordinary prudence would take it into account in reaching a decision." *Id*. An environmental effect would be considered "too speculative" for inclusion in the EIS if it cannot be described at the time the EIS is drafted with sufficient specificity to make its consideration useful to a reasonable decision-maker. *Id*. at 768. Nevertheless, "[r]easonable forecasting . . . is . . . implicit in NEPA, and we must reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as 'crystal ball inquiry.'" *Scientists' Inst. for Pub. Info. v. Atomic Energy Comm'n*, 481 F.2d 1079, 1092 (D.C. Cir. 1973).

II. BLM Failed to Consider Data Relevant to Enefit's Oil Shale Operations

BLM can, using publically available data, forecast air, greenhouse gas, waste, and other environmental impacts based on Enefit's current use of Enefit280 technology in Estonia and other available data regarding oil shale impacts.

a. The Enefit280 Process

Enefit has stated that it intends to use a process known as Enefit280 to convert oil shale to synthetic crude oil at its South Project in Utah.[1] This is technology that Enefit touts on its website for its Utah operations as "proven" because the company has operated a retort facility using the Enefit280 technology in Estonia since approximately 2012. Eesti Energia details the results of the Enefit280 operation in its 2016 Q1 interim financial report: "During the quarter, our new Enefit280 oil plant increased its output to 38 thousand tonnes and for the first time contributed more than half of our total shale oil output."[2] Additionally, there is ample scholarship, reports, and available data focused on oil shale mining impacts both in Estonia and in the United States that BLM should have considered in the draft EIS.

There are extensive studies on the use of Enefit280 technology in Estonia and the oil shale industry in Estonia. Enefit has contracted studies on the Enefit280 technology sufficient to allow them to estimate carbon emissions from the Enefit280 technology. In 2010, Enefit commissioned Jacobs Consultancy to perform a study focused on Enefit's CO_2 intensity,[3] which evaluated the energy return on investment of the Enefit shale oil industry in Estonia and Enefit's emissions. In its corporate and social responsibility report of 2014, Eesti Energia states that it has performed or commissioned "studies to investigate the environmental impacts of oil shale mining and processing…in order to compare the benefits of oil shale industry with costs arising from

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[1] Enefit American Oil, *RD&D Development Plan*, July 19, 2012 at 10-11; *see also*, Hrenko, R., Enefit American Oil: Introduction and Progress Update, University of Utah Unconventional Fuel Conference, Presentation. May 14, 2012. Salt Lake City, Utah. *available at* http://content.lib.utah.edu/utils/getfile/collection/ir-eua/id/3190/filename/3177.pdf

[2] Eesti Energia, Q1 2016 Interim Report 1 January 2016 – 31 March 2016, at 4, *available at* https://www.energia.ee/-/doc/10187/pdf/concern/Interim_report_2016_Q1_eng.pdf.

[3] Aarna, I., Lauringson , T. Carbon intensity, water use and EROI of production of upgraded shale oil products using the Enefit280 technology. October 2011. Presentation, Golden, CO. *available at* http://www.costar-mines.org/oss/31/F-pres-sm-sec/12-4_Aarna_Indrek.pdf

environmental impacts"; and assessments of "the environment impacts of [oil shale] mining including the impact of mining on fauna, water level and groundwater."[4] Additionally, the air emissions, carbon output, and waste disposal of the Estonian oil shale industry have all been measured and studied by scientists, academics, and regulators.[5]

Enefit has also provided information about the use of the Enefit 280 technology in Utah, including data as detailed as process diagrams, in its investor reports and promotional material.[6] And if Enefit can estimate the number of employees, volume of water required, and tax revenues likely to result from the South Project, as it does in the draft EIS and elsewhere, it can and must generally disclose air, climate, and waste impacts.

The draft EIS's lack of details on environmental impacts of the South Project, which results largely from Enefit alleging that it has not yet identified exact project parameters, is particularly troubling given that the environmental challenges associated with ex situ mining and the operation of surface retorts in Estonia have been thoroughly studied. Similarly, in the United States, the few limited ex situ operations that did operate produced a range of scholarship that documented a number of environmental challenges associated with these types of developments.

b. Solid and Hazardous Waste Impacts

A significant environmental impact of mining and processing of oil shale is that it creates substantially more solid waste by volume than what is originally mined.[7] More troubling is that after the shale is retorted, the residual char, or spent shale, is chemically altered for the worse. The spent shale, transformed due to its exposure to increased temperatures, contains a number of soluble inorganics including significant quantities of arsenic and selenium.[8] Compounding matters, spent shale also contains highly carcinogenic polycyclic aromatic hydrocarbons (PAHs).[9][10] In fact, toxic levels of PAHs were found in Green River Basin spent shale that was produced in the early 1980's.[11]

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[4] Eesti Energia, Corporate and Social Responsibility Report, 2014, *available at* https://www.energia.ee/-/doc/10187/pdf/concern/keskkonnaaruanne_2014_eng.pdf.

[5] *See, e.g.,* Gavrilova et al., *Life Cycle Analysis of the Estonian Oil Shale Industry*, Tallin Univeristy of Technology, 2005; Brandt, A. *Greenhouse gas emissions from liquid fuels produced from Estonian oil shale*. January 2011. Prepared for European Commission - Joint Research Center, *available at* https://circabc.europa.eu/sd/d/9ab55170-dc88-4dcb-b2d6-e7e7ba59d8c3/Brandt_Estonian_Oil_Shale_Final.pdf

[6] *See, e.g.,* Enefit. Presentation, *available at* http://content.lib.utah.edu/utils/getfile/collection/ir-eua/id/3257/filename/3267.pdf; Enefit, *Retorting Enefit 280*, https://www.enefit.com/retorting-enefit280

[7] The BLM conservatively estimated in the 2007 oil shale PEIS that "Regardless of the retort, spent shale volume would increase by 30%." BLM. Draft: OSTS PEIS. 2007d. 4.1.1, P. 4-6.

[8] *Id*, 4.14.1.2, P. 4-167.

[9] Irha, N.; E. Teinemaa. *Behavior of Three- to Four-Ring PAHs in the Presence of Oil Shale Ash and Aluminosilicate Matter*. 2002. Polycyclic Aromatic Compounds. Volume 22. P. 663 - 671.

[10] Enefit has made claims in various forums and within promotional materials that waste issues will not be as acute with the Enefit 280 process, but the company has not produced any academic studies or other rigorous documentation that substantiates such a prediction.

[11] IARC. Polynuclear Aromatic Compounds, Part 4, *Bitumens, Coal-Tars and Derived Products, Shale-Oils and Soots, Summary of Data Reported and Evaluation, on the Evaluation of Carcinogenic Risks to Humans*, World Health Organization, last updated April 20, 1998. 1985, Volume 35. *available at* http://monographs.iarc.fr/ENG/Monographs/vol35/volume35.pdf.

Even under the best of circumstances, it is not technically evident that one can fully segregate the hazardous char waste stream from the rest of the retorted spent shale material.[12] The inability to separate or manage for these mixed waste streams presents additional challenges. Intrusion and exposure to water concentrates undesirable inorganic elements into quantities that pose critical problems for the overall welfare of an ecosystem.[13] Given the generous volume of wastes produced by a retort facility, the sheer industrial scale of such an operation presents considerable challenges in any endeavor to stabilize and manage such a waste stream. Preventing leaching of inorganic elements in a spent shale waste pile has so far proven to be a practical impossibility.

The abandoned Anvil Points retorting facility near Rifle, Colorado presents a case in point. The experimental retort facility processed shale from 1947 to 1984. During its run, Anvil Points created 61 tons of spent shale.[14] This modest amount of spent shale would be dwarfed by what has been proposed by Enefit. In 2007, BLM estimated that a facility of the size being proposed by Enefit, with the expressed goal of a 50,000 bbl/d, would produce upwards of 23 million tons of spent shale waste a year.[15]

It has been decades since the Anvil Points facility was abandoned, but those 60 tons have been leaching a number of critical inorganic elements into the region's surface water. Foremost in the Anvil Points' leachate is the presence of arsenic - created during the retorting process - that continues to discharge at quantities exceeding Colorado Water Quality Standards.[16] The mere existence of 60 tons of spent shale waste has become a significant environmental and financial liability for the state of Colorado and the federal government. Nearly $65 million dollars have been allocated to remediate the spent shale waste pile and the surrounding site.

Another challenge is the ignitability of spent shale waste piles. Across the planet, a number of oil shale operations have been plagued by the combustibility of spent shale waste piles.[17] In Colorado, at the aforementioned Anvil Points spent shale pile, a 1995 Department of Energy site report found that, "The shale pile has been self-retorting intermittently since at least 1979, and that heat and vapors from this *in situ* combustion are generated."[18] The Enefit right-of-way draft EIS does not address these impacts.

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[12] Karhu, A. *Environmental hazard of the waste streams of Estonian oil shale industry*. 2006. Oil Shale. Vol 23. P. 53-93.

[13] Argonne National Laboratory. *Environmental Consequences of, and Control Processes For, Energy Technologies*. 1990. P. 102-115.

[14] Meade, R.B. *Tailings and Mine Waste '02: Proceedings of the Ninth International Conference on Tailings and Mine Waste*, Fort Collins, Colorado, USA, 27-30 January 2002. P. 428.

[15] BLM. Draft: OSTS PEIS. 4.9.1.1.2 4- p. 119. Notably, the Enefit right-of-way draft EIS fails to contain any such estimate.

[16] Besides critically elevated levels of arsenic, other inorganic elements leaching from the Anvil Points spent shale waste site include: aluminum, arsenic, boron, barium, chromium, cobalt, copper, iron, lithium, magnesium, manganese, molybdenum, sodium, nickel, lead, vanadium, and zinc. See: BLM. Hazardous Materials Management/Abandoned Mine Land Management Applicable or Relevant and Appropriate Requirements. 2007. TR-1703-1/TR-3720-1. P. 23.

[17] A United Nations assessment of oil shale found one spent shale pile in Kumla, Sweden had been on fire since 1947. *See*, MacDonald M. E., M. J. Chadwick, G. S. Aslanian, B. S. Beloselsky. *The Environmental Management of Low-grade Fuels*. United Nations Environment Programme by the Stockholm Environment Institute. 1996. P. 137.

[18] Department of Energy Naval Petroleum & Oil Shale Reserves. *Site Environmental Report*. 1995. DOE/FE/62316-T1. P.8

Again, the BLM in its PEIS review expressed that there was a significant degree of uncertainty regarding the agency's wherewithal to properly manage and contain spent shale given the number of unknown issues:

> Regardless of the disposal option selected, a number of issues need to be addressed, including the structural integrity of emplaced spent shale, an increase in volume (and decrease in density) over raw shale during the retorting process (this has become known as "the popcorn effect"), and the character of leachates from spent shale. Limited research has been conducted on each of these issues (*emphasis added*).[19]

And:

> Field data evaluating the leachate character of spent shale have been collected by the EPA and others. Although the data are limited, there appears to be a clear indication that subjecting oil shale to retorting conditions can result in the mobilization of various ionic constituents contained in the mineral portion of the oil shale.[20]

The EPA, in 2007, also expressed concern about the lack of empirical data necessary to ensure that spent shale waste could be properly managed:

> Waste issues are important, particularly for surface retort methods. EPA is currently coordinating with a number of entities on sampling and analytical protocols regarding wastes derived from retort methods. This is currently a high priority for EPA.[21]

Possibly most telling are the measures that the European Union (EU) have taken to further tighten the regulatory controls that govern the disposition of spent shale as a hazardous material in Estonia. In 2000, facing the inclusion of Estonia as a new member of the EU, the EU adopted increasingly more stringent requirements for the management of spent shale waste.[22] The EU was motivated to act given that Estonia had generated over 110 million tons of spent shale waste (generated from aboveground retorting of oil shale). In 2003, after further analysis revealed that the spent shale waste piles created by the Estonian oil shale industry were exceedingly toxic, the EU issued specific guidance to further regulate the administration of spent shale wastes created by retorting.[23]

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[19] BLM. Draft: OSTS PEIS. A-4, P. A-49.
[20] *Id*.
[21] Hogle, D. 2007 Oil Shale Environmental Issues and Needs Workshop October 18, 2007, Colorado School of Mines, Golden, Colorado. U.S. Department of Energy-Office of Fossil Energy-National Energy Technology Laboratory-Strategic Center for Natural Gas & Oil. 2008. P. 12.
[22] 2000/532/EC: Commission Decision of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste (notified under document number C(2000) 1147) OJ L 226 , 06/09/2000 P. 0003–0024.
[23] Council Decision 2003/33/EC Establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II to Directive 1999/31/EC , OJ L 11/27 , 16.1.2003.

One anecdotal byproduct of increased regulation by the EU was a notable escalation in the number of scientific studies that investigated the hazardous nature of spent shale. Many of these additional analyses originated from Estonia, where past practices by Estonia's oil shale industry had created ample opportunity to scrutinize the impacts of spent shale waste.

Despite this wealth of information, the Enefit right-of-way draft EIS merely acknowledges that there may be some kinds of impacts; declares that such impacts can't be predicted; or declares that whatever the impacts are, they are irrelevant.[24] This lack of analysis violates NEPA.

c. Climate Change and Air Quality Impacts

Besides the spent shale waste issue that has plagued Estonia, the processing of oil shale into electricity and petroleum products has had profound environmental implications in the context of climate change. A number of papers have established that CO_2 emissions from oil shale processing are possibly the dirtiest feedstock to be found on the planet.[25] Even Enefit's promotional materials regarding emission factors – which are based on a number of optimistic or at least unchallenged assumptions – claim that the CO_2 emissions of the Enefit 280 process will still be dirtier than current conventional fuel development or even tar sands.[26]

Our organizations understand that it is likely that the Utah operation will, due to geology and design, not be *exactly* the same as Enefit's operations in Estonia. However, Enefit's Estonian operations are clearly models for what Enefit will construct in Utah. Therefore, available studies, reports and other available information provide a useful metric for the public and decision-makers to understand the likely nature and scale of impacts to air quality and climate, something now completely omitted from the draft EIS, in violation of NEPA.

III. Conclusion.

The South Project and Enefit's plans to expand its mining activities onto federal and state land are both connected actions and cumulative impacts of the right-of-way decision. As part of its NEPA obligations, BLM should comply with its reasonable forecasting obligations using the existing data on of the Enefit280 technology and the impacts of oil shale in Estonia and in the United States in its analysis in the draft EIS. BLM's failure to do so violates NEPA regulations

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[24] *See* Enefit Right-of-Way Draft EIS at 4-68 (stating only vaguely that "Spent shale piles and mine tailings … might be sources of contamination for salts, metals, and hydrocarbons for both surface and groundwater"); *id*. at 4-70, 4-72, and 4-94 (making similar statements). *See also id*. at 4-138 (declining to disclose any information about the public health or other impacts of spent shale, alleging that such data is "unknown, and cannot be obtained, due to the fact that design and engineering of the South Project will change based on whether or not the BLM allows the Applicant to build one or more of the proposed utilities. BLM believes this unknown information is not essential to a reasoned choice between alternatives").

[25] Brandt, A. *Greenhouse gas emissions from liquid fuels produced from Estonian oil shale*. January 2011. Prepared for European Commission - Joint Research Center, *available at* https://circabc.europa.eu/sd/d/9ab55170-dc88-4dcb-b2d6-e7e7ba59d8c3/Brandt_Estonian_Oil_Shale_Final.pdf; Mui, S., Tonachel, L., McEnaney, B., Shope, E. *GHG Emission Factors for High Carbon Intensity Crude Oils*. 2010. Natural Resources Defense Council, *available at* https://www.nrdc.org/sites/default/files/ene_10070101a.pdf.

[26] Aarna, I., Lauringson , T. *Carbon intensity, water use and EROI of production of upgraded shale oil products using the Enefit280 technology*. October 2011. Presentation, Golden, CO, *available at* http://www.costar-mines.org/oss/31/F-pres-sm-sec/12-4_Aarna_Indrek.pdf.

and deprives the public of the opportunity to understand Enefit's impact on public health and the environment.

Developing the oil shale industry in the United States will have significant impacts on our land, species, water, and climate. Yet, if the status quo continues, Enefit will begin operations of the first commercial-scale oil shale project in the United States under a flawed NEPA review that fails to consider available and relevant information about the environmental and public health impacts of oil shale mining and processing. We urge EPA to exert its influence as a regulatory agency and coordinating agency to improve the ongoing NEPA process.

We attach a list of referenced studies, any of which we are happy to provide at your request.

Sincerely,

Edward B. Zukoski,
Staff Attorney
Earthjustice, Rocky Mountain Office
633 17th Street, Suite 1600
Denver, CO 80202
(303) 996.9622

Bobby McEnaney
Senior Deputy Director
Western Renewable Energy Project
Natural Resource Defense Council
1152 15th Street NW Suite 300.
Washington, D.C. 20005
(202) 289.6868.

Anne Mariah Tapp
Energy Program Director
Grand Canyon Trust
2601 N. Fort Valley Rd
Flagstaff, AZ 86001
(512) 565.9906

Rob DuBuc
Staff Attorney
Western Resource Advocates
150 South 600 East, Ste 2A
Salt Lake City, Utah 84102
(801) 487.9911

Steve Bloch
Legal Director
Southern Utah Wilderness Alliance
425 East 100 South
Salt Lake City, UT 84111
(801) 428.3981

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