

ISS Cost-Benefit Analysis Summary

Boring	Added Cost to Treat DNAPL Occurrence Under Consideration (\$)	Does treatment meaningfully reduce risk? (see narrative)	Is the additional cost reasonable?	Include in ISS prism?	Narrative Summary of DNAPL Occurrence and Treatment Benefits
TG-PW6-130	\$ 24,249	No	No	No	This TarGOST Response is a false positive via Tau Trend Analysis and included as an example only. False positives will not be included in an ISS prism. This DNAPL occurrence (included in original prism) is thin and mostly residual (with less than one inch of transitional DNAPL). Due to its location, if left untreated, is not at risk of causing dissolved COC impact to uncontaminated or relatively uncontaminated areas or impairing restoration of Portland Harbor. If this DNAPL occurrence were not a false positive, ISS would not provide meaningful reduction in risk and would not merit treatment. Because this was identified as a false positive, this occurrence was evaluated and described as an example only.
TG-PW14_030822	\$ 275,556	Yes	Yes	Yes	This TarGOST Response is included as an example of an existing DNAPL occurrence that would be in an ISS prism based on this LOE evaluation if it were not already included in a proposed ISS prism. This DNAPL occurrence is potentially mobile and thick (14 feet of DNAPL, 4.7 feet of which is potentially mobile). For this reason, and in relation to the IRAM nearshore upland ISS area of interest, the additional cost of including this DNAPL occurrence would be considered commensurate with the additional certainty of preventing DNAPL between the future barrier wall and the future HC&C system alignment from migrating downward or laterally between areas of treatment.
B-58	\$ 65,823	No	No	No	This DNAPL occurrence is a thin (0.01 foot) layer of residual DNAPL that is shallow. There is not a risk of DNAPL mobilization or dissolved phase COCs migrating to relatively uncontaminated areas or recontaminating Portland Harbor. Inclusion in an ISS prism would provide no meaningful risk reduction. However, a TarGOST boring is recommended at this location to confirm the described nature of this DNAPL occurrence.
TG-PW5-85A	\$ 4,478	No	No	No	This TarGOST Response is a false positive via Tau Trend Analysis and included as an example only. False positives will not be included in an ISS prism. This DNAPL occurrence is adjacent to an existing ISS prism. ISS of this DNAPL occurrence (assuming it was not represented by a false positive) would not provide a meaningful reduction in risk based on saturation, location, and thickness and therefore would not be included in a treatment prism. Because this occurrence was identified by a false positive, this occurrence was evaluated and described as an example only.
DG-Core-19	\$ 30,311	No	No	Yes	This residual DNAPL occurrence is based on a boring log description and corresponding DNAPL mobility sample. There is not risk of DNAPL mobilization due to its residual nature, or of dissolved phase COCs migrating to relatively uncontaminated areas or impairing restoration of Portland Harbor due to location. The IRAM SCMs will contain and treat this DNAPL occurrence. However, because the occurrence was not based on TarGOST, and there is only a relatively minor increased cost to include this occurrence; and inclusion will support continuity with the larger ISS prism on all sides, we recommend the inclusion of this DNAPL occurrence in an ISS treatment prism.
TMA3-2a	\$ 53,733	No	No	No3	This DNAPL (included in original prism) occurrence is a thin interval (0.8 foot thick) of potentially mobile DNAPL based on TarGOST response. This DNAPL is not likely to migrate beyond the top of the riverbank due to the barrier wall presence, nor will it be a source of dissolved phase COCs that may migrate to uncontaminated areas or potentially recontaminate Portland Harbor. For these reasons, the added cost to treat this thin occurrence does not have commensurate benefit.
TMA3-062216	\$ 689	No	No	No	This TarGOST Response is a false positive via Tau Trend Analysis and included as an example only. False positives will not be included in an ISS prism. This DNAPL occurrence (included in original prism) is a shallow false positive with multiple instances of no DNAPL in surrounding borings. If this DNAPL were not a false positive, ISS would not provide any meaningful risk reduction (based on location and thickness). The current prism will be updated to exclude this false positive.
TMA2 borings	\$ 22,389	No	No	No	These TarGOST Responses are false positives via Tau Trend Analysis and included as an example only. Evaluation assumes TarGOST responses are not false positives and representative of DNAPL for discussion purposes only. False positives will not be included in an ISS prism. These DNAPL occurrences are shallow (near the bottom of the fill) and are all of residual saturation. There is no risk of DNAPL mobilization or dissolved COCs from the DNAPL migrating to relatively uncontaminated areas or recontaminating Portland Harbor. The IRAM SCMs will contain and treat these DNAPL occurrences. There is no meaningful risk reduction from treatment and therefore inclusion in an ISS prism is not recommended. Because this was identified as a false positive, this occurrence was evaluated and described as an example only.

ISS Cost-Benefit Analysis Summary

Boring	Added Cost to Treat DNAPL Occurrence Under Consideration (\$)	Does treatment meaningfully reduce risk? (see narrative)	Is the additional cost reasonable?	Include in ISS prism?	Narrative Summary of DNAPL Occurrence and Treatment Benefits
TMA3-1b	\$ 161,448	Yes	Yes	Yes	This TarGOST Response is included as an example of an existing DNAPL occurrence that would be in an ISS prism based on this LOE evaluation if it were not already included in a proposed ISS prism. This DNAPL occurrence is potentially mobile and thick (5.3 feet of DNAPL, 3.4 feet of which is potentially mobile). For this reason, the additional cost of including this DNAPL occurrence would be considered commensurate with the additional certainty of preventing DNAPL between the future barrier wall and the future HC&C system alignment from migrating downward or laterally between areas of treatment.
TG-10	\$ 284,844	No	No	No	This DNAPL occurrence consists of a few small spikes in the TarGOST response above the threshold of 10%RE representing residual DNAPL. Because it is residual, there is no risk of the DNAPL migrating. The IRAM SCMs will contain and treat groundwater COCs from this DNAPL occurrence. However, in the unlikely event that dissolved COCs migrate to Deep Lower Alluvium WBZ groundwater based on proximity, fate and transport analyses indicate these COCs would attenuate to acceptable levels before reaching receptors in the river sediments. The cost to include this DNAPL occurrence in a current ISS prism is not considered reasonable because the risk to receptors or Portland Harbor restoration impairment is negligible, and this occurrence will be fully mitigated through the IRAM SCMs. However, because the TarGOST data are older and quite noisy, we recommend installing a new TarGOST boring at this location to confirm the described nature of this DNAPL occurrence.
TG-PW3 031622	\$ 75,260	Yes	Yes	Yes	This TarGOST Response is a false positive via Tau Trend Analysis and included as an example only. Evaluation simulates the TarGOST response as valid and representative of DNAPL for discussion purposes only. False positives will not be included in an ISS prism. This DNAPL occurrence is a vertically isolated layer of DNAPL underlying 10 feet of soil not impacted with DNAPL. The risk factors include potential mobility, thickness greater than 1 foot, and location near the clean Deep Lower Alluvium WBZ. The IRAM measures will contain and treat this DNAPL occurrence; however, ISS treatment of this DNAPL occurrence (between the future barrier wall and future HC&C system alignment) would mitigate some risk of future migration into the Deep Lower Alluvium WBZ. For this reason, the additional cost of including this DNAPL occurrence in a prism would be considered reasonable relative to the potential risk reduction. Because this was identified as a false positive, this occurrence was evaluated and described as an example only.
TG-12S	\$ 3,839,815	Yes	Yes	Yes	This TarGOST Response is included as an example of an existing DNAPL occurrence that would be in an ISS prism based on this LOE evaluation if it were not already currently in a proposed ISS prism. This DNAPL occurrence is potentially mobile, within close proximity to the Deep Lower Alluvium WBZ, and thick (14 feet of DNAPL, 8 feet of which is potentially mobile). For this reason, the additional cost of including this DNAPL occurrence would be considered commensurate with the additional certainty of preventing DNAPL between the future barrier wall and the future HC&C system alignment from migrating into the Deep Lower Alluvium WBZ and past the top of bank.
TG-PW2 031522	\$ 2,953,516	Yes	Yes	Yes	This TarGOST Response is included as an example of an existing DNAPL occurrence that would be in an ISS prism based on this LOE evaluation if it were not already currently in a proposed ISS prism. This DNAPL occurrence is potentially mobile, within close proximity to the Deep Lower Alluvium WBZ, and thick (21 feet). ISS treatment of this DNAPL occurrence would improve ability to meet IRAM objectives by ensuring that potentially mobile DNAPL in close proximity to the Deep Lower Alluvium WBZ would be immobilized. For this reason, the additional cost of including this DNAPL occurrence would be considered commensurate with the additional certainty of preventing DNAPL between the future barrier wall and the future HC&C system alignment from migrating into the Deep Lower Alluvium WBZ and past the top of bank.
WS-47-183	\$ 2,100,393	No	No	No	This DNAPL occurrence is deep and is close to the Deep Lower Alluvium WBZ. The occurrence has been categorized as residual DNAPL and is therefore not at risk of mobilizing. The IRAM SCMs will contain and treat dissolved COCs in groundwater from this DNAPL occurrence. However, in the unlikely event that dissolved COCs migrate to the Deep Lower Alluvium WBZ based on proximity, a fate and transport analysis indicates these groundwater COCs would attenuate to acceptable levels before reaching the river. The cost to include this occurrence in an ISS prism is not considered reasonable because the risk to receptors or Portland Harbor impairment is negligible and the occurrence will be fully managed through the IRAM SCMs. However, because this occurrence was classified solely based on a boring log description, and due to location, a TarGOST boring is recommended at this location to confirm the described nature of this DNAPL occurrence.

ISS Cost-Benefit Analysis

Boring	Information About DNAPL Occurrence Under Consideration					Cost Info		DNAPL Occurrence Risk Factors				IRAM Objectives			Does treatment meaningfully reduce risk? (see narrative)	Is the additional cost reasonable?	Include in ISS prism?	Narrative Summary of DNAPL Occurrence and Treatment Benefits			
	Bottom Depth of DNAPL Occurrence (feet below platform)	DNAPL Occurrence Thickness (feet)	Volume of DNAPL Impacted Soils (cy)	Volume of Clean Overburden Soils (cy)	ISS Technology Required (CSM or auger)	Current ISS Prism Cost (\$)	Added Cost to Treat DNAPL Occurrence Under Consideration (\$)	DNAPL Saturation (L-M-H)	Location - Vertical Proximity to Deep Lower Alluvium WBZ and River Bottom (L-M-H)	DNAPL Occurrence Thickness (L-M-H)*	Do IRAM SCMs (HC&C system and barrier wall) contain and treat the DNAPL occurrence under consideration and protect surface water beneficial uses?	Improve Ability to Meet Source Control Objectives?		Improve Ability to Meet Removal Action Objectives?							
												Prevent DNAPL migration beyond the top of the riverbank?	Control migration of contaminated groundwater from the Fill and Alluvium WBZs to Willamette River sediments, porewater, and surface water ¹	Excavate or treat DNAPL within the nearshore upland ISS area of interest by reducing its concentration, volume, toxicity, and mobility, and reduce leaching of COCs from DNAPL to Fill and Alluvium WBZs groundwater?					Prevent the migration/exacerbation of upland DNAPL and contaminated groundwater laterally and vertically along the shoreline to uncontaminated or minimally contaminated areas?	Minimize DNAPL migration around, below, or between ISS-treated soils within the nearshore upland ISS area of interest?	
TG-PW6-130	75	0.7	4	126	Auger	\$ 58,418	\$ 24,249	M	L	L	Yes	No	No	Yes ²	No	No	No	No	No	No	This TarGOST Response is a false positive via Tau Trend Analysis and included as an example only. False positives will not be included in an ISS prism. This DNAPL occurrence (included in original prism) is thin and mostly residual (with less than one inch of transitional DNAPL). Due to its location, if left untreated, is not at risk of causing dissolved COC impact to uncontaminated or relatively uncontaminated areas or impairing restoration of Portland Harbor. If this DNAPL occurrence were not a false positive, ISS would not provide meaningful reduction in risk and would not merit treatment. Because this was identified as a false positive, this occurrence was evaluated and described as an example only.
TG-PW14_030822	38	14	519	963	Auger	\$ 2,259,556	\$ 275,556	H	M	H	Yes	No	No	Yes ²	No	Yes	Yes	Yes	Yes	Yes	This TarGOST Response is included as an example of an existing DNAPL occurrence that would be in an ISS prism based on this LOE evaluation if it were not already included in a proposed ISS prism. This DNAPL occurrence is potentially mobile and thick (14 feet of DNAPL, 4.7 feet of which is potentially mobile). For this reason, and in relation to the IRAM nearshore upland ISS area of interest, the additional cost of including this DNAPL occurrence would be considered commensurate with the additional certainty of preventing DNAPL between the future barrier wall and the future HC&C system alignment from migrating downward or laterally between areas of treatment.
B-58	13.3	0.1	1	353	Auger	\$ 2,471,733.33	\$ 65,823	L	M	L*	Yes	No	No	Yes ²	No	No	No	No	No	No	This DNAPL occurrence is a thin (0.01 foot) layer of residual DNAPL that is shallow. There is not a risk of DNAPL mobilization or dissolved phase COCs migrating to relatively uncontaminated areas or recontaminating Portland Harbor. Inclusion in an ISS prism would provide no meaningful risk reduction. However, a TarGOST boring is recommended at this location to confirm the described nature of this DNAPL occurrence.
TG-PW5-85A	64	0.8	0.3	24	Auger	\$ 25,076	\$ 4,478	L	M	L*	Yes	No	No	Yes ²	No	No	No	No	No	No	This TarGOST Response is a false positive via Tau Trend Analysis and included as an example only. False positives will not be included in an ISS prism. This DNAPL occurrence is adjacent to an existing ISS prism. ISS of this DNAPL occurrence (assuming it was not represented by a false positive) would not provide a meaningful reduction in risk based on saturation, location, and thickness and therefore would not be included in a treatment prism. Because this occurrence was identified by a false positive, this occurrence was evaluated and described as an example only.

ISS Cost-Benefit Analysis

Boring	Information About DNAPL Occurrence Under Consideration					Cost Info		DNAPL Occurrence Risk Factors				IRAM Objectives			Does treatment meaningfully reduce risk? (see narrative)	Is the additional cost reasonable?	Include in ISS prism?	Narrative Summary of DNAPL Occurrence and Treatment Benefits		
	Bottom Depth of DNAPL Occurrence (feet below platform)	DNAPL Occurrence Thickness (feet)	Volume of DNAPL Impacted Soils (cy)	Volume of Clean Overburden Soils (cy)	ISS Technology Required (CSM or auger)	Current ISS Prism Cost (\$)	Added Cost to Treat DNAPL Occurrence Under Consideration (\$)	DNAPL Saturation (L-M-H)	Location - Vertical Proximity to Deep Lower Alluvium WBZ and River Bottom (L-M-H)	DNAPL Occurrence Thickness (L-M-H)*	Do IRAM SCMs (HC&C system and barrier wall) contain and treat the DNAPL occurrence under consideration and protect surface water beneficial uses?	Improve Ability to Meet Source Control Objectives?		Improve Ability to Meet Removal Action Objectives?						
												Prevent DNAPL migration beyond the top of the riverbank?	Control migration of contaminated groundwater from the Fill and Alluvium WBZs to Willamette River sediments, porewater, and surface water? ¹	Excavate or treat DNAPL within the nearshore upland ISS area of interest by reducing its concentration, volume, toxicity, and mobility, and reduce leaching of COCs from DNAPL to Fill and Alluvium WBZs groundwater?					Prevent the migration/exacerbation of upland DNAPL and contaminated groundwater laterally and vertically along the shoreline to uncontaminated or minimally contaminated areas?	Minimize DNAPL migration around, below, or between ISS-treated soils within the nearshore upland ISS area of interest?
DG-Core-19	30	1	4	159	Auger	\$ 1,144,106.67	\$ 30,311	L	M	L*	Yes	No	No	Yes ²	No	No	No	No	Yes	This residual DNAPL occurrence is based on a boring log description and corresponding DNAPL mobility sample. There is not risk of DNAPL mobilization due to its residual nature, or of dissolved phase COCs migrating to relatively uncontaminated areas or impairing restoration of Portland Harbor due to location. The IRAM SCMs will contain and treat this DNAPL occurrence. However, because the occurrence was not based on TarGOST, and there is only a relatively minor increased cost to include this occurrence; and inclusion will support continuity with the larger ISS prism on all sides, we recommend the inclusion of this DNAPL occurrence in an ISS treatment prism.
TMA3-2a	65	0.8	4	285	Auger	\$ -	\$ 53,733	H	M	L	Yes	No	No	Yes ²	No	No	No	No	No ³	This DNAPL (included in original prism) occurrence is a thin interval (0.8 foot thick) of potentially mobile DNAPL based on TarGOST response. This DNAPL is not likely to migrate beyond the top of the riverbank due to the barrier wall presence, nor will it be a source of dissolved phase COCs that may migrate to uncontaminated areas or potentially recontaminate Portland Harbor. For these reasons, the added cost to treat this thin occurrence does not have commensurate benefit.
TMA3-062216	12	0.4	0.1	4	Auger	\$ -	\$ 689	H	L	L	Yes	No	No	Yes ²	No	No	No	No	No	This TarGOST Response is a false positive via Tau Trend Analysis and included as an example only. False positives will not be included in an ISS prism. This DNAPL occurrence (included in original prism) is a shallow false positive with multiple instances of no DNAPL in surrounding borings. If this DNAPL were not a false positive, ISS would not provide any meaningful risk reduction (based on location and thickness). The current prism will be updated to exclude this false positive.

ISS Cost-Benefit Analysis

Boring	Information About DNAPL Occurrence Under Consideration					Cost Info		DNAPL Occurrence Risk Factors				IRAM Objectives			Does treatment meaningfully reduce risk? (see narrative)	Is the additional cost reasonable?	Include in ISS prism?	Narrative Summary of DNAPL Occurrence and Treatment Benefits		
	Bottom Depth of DNAPL Occurrence (feet below platform)	DNAPL Occurrence Thickness (feet)	Volume of DNAPL Impacted Soils (cy)	Volume of Clean Overburden Soils (cy)	ISS Technology Required (CSM or auger)	Current ISS Prism Cost (\$)	Added Cost to Treat DNAPL Occurrence Under Consideration (\$)	DNAPL Saturation (L-M-H)	Location - Vertical Proximity to Deep Lower Alluvium WBZ and River Bottom (L-M-H)	DNAPL Occurrence Thickness (L-M-H)*	Do IRAM SCMs (HC&C system and barrier wall) contain and treat the DNAPL occurrence under consideration and protect surface water beneficial uses?	Improve Ability to Meet Source Control Objectives?		Improve Ability to Meet Removal Action Objectives?						
												Prevent DNAPL migration beyond the top of the riverbank?	Control migration of contaminated groundwater from the Fill and Alluvium WBZs to Willamette River sediments, porewater, and surface water ¹	Excavate or treat DNAPL within the nearshore upland ISS area of interest by reducing its concentration, volume, toxicity, and mobility, and reduce leaching of COCs from DNAPL to Fill and Alluvium WBZs groundwater?					Prevent the migration/exacerbation of upland DNAPL and contaminated groundwater laterally and vertically along the shoreline to uncontaminated or minimally contaminated areas?	Minimize DNAPL migration around, below, or between ISS-treated soils within the nearshore upland ISS area of interest?
TMA2 borings	12	2	19	102	Auger	\$ -	\$ 22,389	L	M	L*	Yes	No	No	Yes ²	No	No	No	No	No	<p>These TarGOST Responses are false positives via Tau Trend Analysis and included as an example only. Evaluation assumes TarGOST responses are not false positives and representative of DNAPL for discussion purposes only. False positives will not be included in an ISS prism. These DNAPL occurrences are shallow (near the bottom of the fill) and are all of residual saturation. There is no risk of DNAPL mobilization or dissolved COCs from the DNAPL migrating to relatively uncontaminated areas or recontaminating Portland Harbor. The IRAM SCMs will contain and treat these DNAPL occurrences. There is no meaningful risk reduction from treatment and therefore inclusion in an ISS prism is not recommended. Because this was identified as a false positive, this occurrence was evaluated and described as an example only.</p>
TMA3-1b	84	5.32	55	813	Auger	\$ -	\$ 161,448	H	L	H	Yes	No	No (F&T Eval)	Yes ²	No	Yes	Yes	Yes	Yes	<p>This TarGOST Response is included as an example of an existing DNAPL occurrence that would be in an ISS prism based on this LOE evaluation if it were not already included in a proposed ISS prism. This DNAPL occurrence is potentially mobile and thick (5.3 feet of DNAPL, 3.4 feet of which is potentially mobile). For this reason, the additional cost of including this DNAPL occurrence would be considered commensurate with the additional certainty of preventing DNAPL between the future barrier wall and the future HC&C system alignment from migrating downward or laterally between areas of treatment.</p>

ISS Cost-Benefit Analysis

Boring	Information About DNAPL Occurrence Under Consideration					Cost Info		DNAPL Occurrence Risk Factors				IRAM Objectives			Does treatment meaningfully reduce risk? (see narrative)	Is the additional cost reasonable?	Include in ISS prism?	Narrative Summary of DNAPL Occurrence and Treatment Benefits		
												Improve Ability to Meet Source Control Objectives?	Improve Ability to Meet Removal Action Objectives?							
	Bottom Depth of DNAPL Occurrence (feet below platform)	DNAPL Occurrence Thickness (feet)	Volume of DNAPL Impacted Soils (cy)	Volume of Clean Overburden Soils (cy)	ISS Technology Required (CSM or auger)	Current ISS Prism Cost (\$)	Added Cost to Treat DNAPL Occurrence Under Consideration (\$)	DNAPL Saturation (L-M-H)	Location - Vertical Proximity to Deep Lower Alluvium WBZ and River Bottom (L-M-H)	DNAPL Occurrence Thickness (L-M-H)*	Do IRAM SCMs (HC&C system and barrier wall) contain and treat the DNAPL occurrence under consideration and protect surface water beneficial uses?	Prevent DNAPL migration beyond the top of the riverbank?	Control migration of contaminated groundwater from the Fill and Alluvium WBZs to Willamette River sediments, porewater, and surface water ¹	Excavate or treat DNAPL within the nearshore upland ISS area of interest by reducing its concentration, volume, toxicity, and mobility, and reduce leaching of COCs from DNAPL to Fill and Alluvium WBZs groundwater?					Prevent the migration/exacerbation of upland DNAPL and contaminated groundwater laterally and vertically along the shoreline to uncontaminated or minimally contaminated areas?	Minimize DNAPL migration around, below, or between ISS-treated soils within the nearshore upland ISS area of interest?
TG-10	128	1.3	7	748	CSM	\$ 1,023,541	\$ 284,844	L	H	L*	Yes	No	No (F&T Eval)	Yes ²	Yes (protect Deep Lower Alluvium WBZ)	No	No	No	No	This DNAPL occurrence consists of a few small spikes in the TarGOST response above the threshold of 10%RE representing residual DNAPL. Because it is residual, there is no risk of the DNAPL migrating. The IRAM SCMs will contain and treat groundwater COCs from this DNAPL occurrence. However, in the unlikely event that dissolved COCs migrate to Deep Lower Alluvium WBZ groundwater based on proximity, fate and transport analyses indicate these COCs would attenuate to acceptable levels before reaching receptors in the river sediments. The cost to include this DNAPL occurrence in a current ISS prism is not considered reasonable because the risk to receptors or Portland Harbor restoration impairment is negligible, and this occurrence will be fully mitigated through the IRAM SCMs. However, because the TarGOST data are older and quite noisy, we recommend installing a new TarGOST boring at this location to confirm the described nature of this DNAPL occurrence.
TG-PW3 031622	119	1.5	30	170	CSM	\$ 827,864	\$ 75,260	H	H	M	Yes	Yes	No (F&T Eval)	Yes ²	Yes (protect Deep Lower Alluvium WBZ)	Yes	Yes	Yes	Yes	This TarGOST Response is a false positive via Tau Trend Analysis and included as an example only. Evaluation simulates the TarGOST response as valid and representative of DNAPL for discussion purposes only. False positives will not be included in an ISS prism. This DNAPL occurrence is a vertically isolated layer of DNAPL underlying 10 feet of soil not impacted with DNAPL. The risk factors include potential mobility, thickness greater than 1 foot, and location near the clean Deep Lower Alluvium WBZ. The IRAM measures will contain and treat this DNAPL occurrence; however, ISS treatment of this DNAPL occurrence (between the future barrier wall and future HC&C system alignment) would mitigate some risk of future migration into the Deep Lower Alluvium WBZ. For this reason, the additional cost of including this DNAPL occurrence in a prism would be considered reasonable relative to the potential risk reduction. Because this was identified as a false positive, this occurrence was evaluated and described as an example only.

ISS Cost-Benefit Analysis

Boring	Information About DNAPL Occurrence Under Consideration					Cost Info		DNAPL Occurrence Risk Factors				IRAM Objectives			Does treatment meaningfully reduce risk? (see narrative)	Is the additional cost reasonable?	Include in ISS prism?	Narrative Summary of DNAPL Occurrence and Treatment Benefits	
	Bottom Depth of DNAPL Occurrence (feet below platform)	DNAPL Occurrence Thickness (feet)	Volume of DNAPL Impacted Soils (cy)	Volume of Clean Overburden Soils (cy)	ISS Technology Required (CSM or auger)	Current ISS Prism Cost (\$)	Added Cost to Treat DNAPL Occurrence Under Consideration (\$)	DNAPL Saturation (L-M-H)	Location - Vertical Proximity to Deep Lower Alluvium WBZ and River Bottom (L-M-H)	DNAPL Occurrence Thickness (L-M-H)*	Do IRAM SCMs (HC&C system and barrier wall) contain and treat the DNAPL occurrence under consideration and protect surface water beneficial uses?	Improve Ability to Meet Source Control Objectives?		Improve Ability to Meet Removal Action Objectives?					
												Prevent DNAPL migration beyond the top of the riverbank?	Control migration of contaminated groundwater from the Fill and Alluvium WBZs to Willamette River sediments, porewater, and surface water ¹	Excavate or treat DNAPL within the nearshore upland ISS area of interest by reducing its concentration, volume, toxicity, and mobility, and reduce leaching of COCs from DNAPL to Fill and Alluvium WBZs groundwater?					Prevent the migration/exacerbation of upland DNAPL and contaminated groundwater laterally and vertically along the shoreline to uncontaminated or minimally contaminated areas?
TG-12S	125	14.5	1181	9004	CSM	\$ 10,927,764	\$ 3,839,815	H	H	H	Yes	Yes	No (F&T Eval)	Yes ²	Yes (protect Deep Lower Alluvium WBZ)	Yes	Yes	Yes	This TarGOST Response is included as an example of an existing DNAPL occurrence that would be in an ISS prism based on this LOE evaluation if it were not already currently in a proposed ISS prism. This DNAPL occurrence is potentially mobile, within close proximity to the Deep Lower Alluvium WBZ, and thick (14 feet of DNAPL, 8 feet of which is potentially mobile). For this reason, the additional cost of including this DNAPL occurrence would be considered commensurate with the additional certainty of preventing DNAPL between the future barrier wall and the future HC&C system alignment from migrating into the Deep Lower Alluvium WBZ and past the top of bank.
TG-PW2 031522	127	21	6581	1253	CSM	\$ 12,759,188	\$ 2,953,516	H	H	H	Yes	Yes	No (F&T Eval)	Yes ²	Yes (protect Deep Lower Alluvium WBZ)	Yes	Yes	Yes	This TarGOST Response is included as an example of an existing DNAPL occurrence that would be in an ISS prism based on this LOE evaluation if it were not already currently in a proposed ISS prism. This DNAPL occurrence is potentially mobile, within close proximity to the Deep Lower Alluvium WBZ, and thick (21 feet). ISS treatment of this DNAPL occurrence would improve ability to meet IRAM objectives by ensuring that potentially mobile DNAPL in close proximity to the Deep Lower Alluvium WBZ would be immobilized. For this reason, the additional cost of including this DNAPL occurrence would be considered commensurate with the additional certainty of preventing DNAPL between the future barrier wall and the future HC&C system alignment from migrating into the Deep Lower Alluvium WBZ and past the top of bank.

ISS Cost-Benefit Analysis

Boring	Information About DNAPL Occurrence Under Consideration					Cost Info		DNAPL Occurrence Risk Factors				IRAM Objectives			Does treatment meaningfully reduce risk? (see narrative)	Is the additional cost reasonable?	Include in ISS prism?	Narrative Summary of DNAPL Occurrence and Treatment Benefits			
	Bottom Depth of DNAPL Occurrence (feet below platform)	DNAPL Occurrence Thickness (feet)	Volume of DNAPL Impacted Soils (cy)	Volume of Clean Overburden Soils (cy)	ISS Technology Required (CSM or auger)	Current ISS Prism Cost (\$)	Added Cost to Treat DNAPL Occurrence Under Consideration (\$)	DNAPL Saturation (L-M-H)	Location - Vertical Proximity to Deep Lower Alluvium WBZ and River Bottom (L-M-H)	DNAPL Occurrence Thickness (L-M-H)*	Do IRAM SCMs (HC&C system and barrier wall) contain and treat the DNAPL occurrence under consideration and protect surface water beneficial uses?	Improve Ability to Meet Source Control Objectives?		Improve Ability to Meet Removal Action Objectives?							
												Prevent DNAPL migration beyond the top of the riverbank?	Control migration of contaminated groundwater from the Fill and Alluvium WBZs to Willamette River sediments, porewater, and surface water ¹	Excavate or treat DNAPL within the nearshore upland ISS area of interest by reducing its concentration, volume, toxicity, and mobility, and reduce leaching of COCs from DNAPL to Fill and Alluvium WBZs groundwater?					Prevent the migration/exacerbation of upland DNAPL and contaminated groundwater laterally and vertically along the shoreline to uncontaminated or minimally contaminated areas?	Minimize DNAPL migration around, below, or between ISS-treated soils within the nearshore upland ISS area of interest?	
WS-47-183	137	4	163	5409	CSM	\$ 2,875,253	\$ 2,100,393	L	H	L*	Yes	No	No (F&T Eval)	Yes ²	Yes (protect Deep Lower Alluvium WBZ)	No	No	No	No	No	This DNAPL occurrence is deep and is close to the Deep Lower Alluvium WBZ. The occurrence has been categorized as residual DNAPL and is therefore not at risk of mobilizing. The IRAM SCMs will contain and treat dissolved COCs in groundwater from this DNAPL occurrence. However, in the unlikely event that dissolved COCs migrate to the Deep Lower Alluvium WBZ based on proximity, a fate and transport analysis indicates these groundwater COCs would attenuate to acceptable levels before reaching the river. The cost to include this occurrence in an ISS prism is not considered reasonable because the risk to receptors or Portland Harbor impairment is negligible and the occurrence will be fully managed through the IRAM SCMs. However, because this occurrence was classified solely based on a boring log description, and due to location, a TarGOST boring is recommended at this location to confirm the described nature of this DNAPL occurrence.

ISS Cost-Benefit Analysis

Notes:

DNAPL Saturation

H: potentially mobile

M: transitional

L: residual

Location

H: within 15 feet of Deep Lower Alluvium WBZ

M: at elevation above the base of the adjacent river

L: at elevation below base of river and not within 15 feet of Deep Lower Alluvium WBZ

Thickness of Potentially Mobile DNAPL

H: greater than 2 feet

M: 1 to 2 feet

L: less than 1 foot

* If DNAPL is residual, thickness is conservatively scored as an L

1. Control migration of contaminated groundwater from the Fill and Alluvium WBZs to Willamette River sediments, porewater, and surface water to do the following:

- Prevent recontamination of the Portland Harbor Superfund Site (Portland Harbor) sediments above remedial action levels or principal threat waste thresholds
- Prevent impairing long-term Portland Harbor remedial action objective attainment.

2. Although additional treatment improves ability achieve this RAO, this improved ability does not directly correlate with risk reduction.

3. Although benefit is not commensurate with additional cost of treatment, this DNAPL occurrence was included in NW Natural's original agreed-upon scope of work. To honor the original agreement, this zone will be included for treatment if requested by DEQ.