



ENVIRONMENTAL RESEARCH CONSULTING

Hudson River Oil Spill Risk Assessment

Volume 7: Spill Scenario Summaries

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Cover Photograph Credits

The photographs on the report cover were taken by Dagmar Schmidt Etkin (Esopus Meadows Lighthouse and articulated tank barge) and Steve Kardian (bald eagle) on the Hudson River.

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Acronyms and Abbreviations

ACP: Area Contingency Plan AMPD: average most-probable discharge **ATB:** articulated tank barge **bbl:** barrels of oil (equivalent of 42 gallons) **bbl/hr:** barrels per hour BTEX: benzene, toluene, ethylbenzene, and xylene **CBR:** crude-by-rail ERC: Environmental Research Consulting F: degrees Fahrenheit ft: feet gal: gallons gpm: gallons per minute GRP: geographic response plan **GRS:** geographic response strategy g/m²: grams per square meter HFO: heavy fuel oil **HHO:** home heating oil hr: hours kts: knots Lat: latitude

LFL: lower flammability limit (lower end of the concentration range over which a flammable mixture of gas or vapor in air can be ignited at a given temperature and pressure)

Lon: longitude

mi: miles

mi²: square miles

mg/l: milligrams per liter

MMPD: maximum most-probable discharge

NCP: National Contingency Plan

OSRO: oil spill removal organization

p: probability

psi: pounds per square inch (pressure)

RP: responsible party

SCAT: Shoreline Cleanup Assessment Technique

UFL: upper flammability limit (upper end of the concentration range over which a flammable mixture of gas or vapor in air can be ignited at a given temperature and pressure)

USCG: US Coast Guard

VRP: vessel response plan

WCD: worst-case discharge

Hudson River Oil Spill Risk Assessment Report Volumes

The Hudson River Oil Spill Risk Assessment (HROSRA) is composed of seven separate volumes that cover separate aspects of the study.

Executive Summary (HROSRA Volume 1)

The first volume provides an overall summary of results in relatively non-technical terms, including:

- Purpose of study;
- Brief explanation of risk as "probability times consequences" and the way in which the study addresses these different factors;
- Brief discussion of oil spill basics;
- Results the "story" of each spill scenario, including the oil trajectory/fate/exposure, fire/explosion brief story (if applicable), and a verbal description of the consequence mitigation (response spill and fire emergency); and
- Brief summary of spill mitigation measures with respect to response preparedness and prevention.

HROSRA Volume 2

The second volume provides an overview of the study approach and general introduction to unique features of the Hudson River.

HROSRA Volume 3

The third volume reviews the potential sources of oil spillage. It also presents the analyses of the probability of occurrences of spills of varying sizes from the potential sources under different conditions of traffic and oil transport.

HROSRA Volume 4

The fourth volume presents the analyses of the potential consequences or impacts of hypothetical spills, including the trajectory and fate of spills to the water, and the potential exposure of resources above thresholds of concern, based on oil modeling (including Appendices with detailed figures, etc.).

HROSRA Volume 5

The fifth volume presents the analyses of potential consequences or impacts of hypothetical fire and explosion events that may occur in addition to oil spills.

HROSRA Volume 6

The sixth volume presents the analyses of spill mitigation measures to reduce the risk of spills through prevention, preparedness, and response. The volume includes response and preparedness considerations for the specific modeled scenarios, as well as overall response issues for the Hudson River. It also includes more generic descriptions of prevention measures (vessels, trains, facilities, etc.).

HROSRA Volume 7

The seventh volume presents the summary tables with data – including probabilities, spill modeling, fire/explosion analysis, and response considerations for each of the 72 modeled spill scenarios. This volume pulls together everything from HROSRA Volumes 3, 4, 5, and 6.

Research Team

Dagmar Schmidt Etkin, PhD (Environmental Research Consulting)

Dr. Etkin has 42 years of experience in environmental analysis–14 years investigating issues in population biology and ecological systems, and 28 years specializing in the analysis of oil spills. Since 1999, she has been president of Environmental Research Consulting (ERC) specializing in environmental risk assessment, and spill response and cost analyses. She has been an oil spill consultant to the US Coast Guard, EPA, NOAA, Army Corps of Engineers, the Bureau of Ocean Energy Management, the Bureau of Safety and Environmental Enforcement, various state governments, the Canadian government, the oil and shipping industries, and non-governmental organizations. She is internationally recognized as a spill expert and has been a member of the UN/IMO/UNEP/UNESCO Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) since 1997. She has a BA in Biology from University of Rochester, and received MA and PhD degrees from Harvard University in Organismic/Evolutionary Biology, specializing in ecological modeling and statistics.

Deborah French McCay, PhD (RPS Ocean Science)

Dr. French McCay (formerly Dr. French) specializes in quantitative assessments and modeling of aquatic ecosystems and populations, oil and chemical transport and fates, and biological response to pollutants. She has developed water quality, food web and ecosystem models for freshwater, marine and wetland ecosystems. She is an expert in modeling of oil and chemical fates and effects, toxicity, exposure and the bioaccumulation of pollutants by biota, along with the effects of this contamination. Her population modeling work includes models for plankton, benthic invertebrates, fisheries, birds and mammals. These models have been used for impact, risk, and natural resource damage assessments, as well as for studies of the biological systems. She has provided expert testimony in hearings regarding environmental risk and impact assessments. She has over 30 years of experience in analyzing oil spills and is considered one of the leading international experts on the fate and effects of oil spills. She has a BA in Zoology from Rutgers College, and a PhD in Biological Oceanography from the Graduate School of Oceanography, University of Rhode Island.

Jill Rowe (RPS Ocean Science)

Jill Rowe specializes in biological and environmental data gathering, analysis and management; natural resource damage assessment (NRDA) modeling and analysis of pollutant fates and effects; ecological risk assessment; impact assessment of dredging and development projects, preparing sections of Environmental Impacts Statements; providing NEPA support, and GIS mapping and analysis. Ms. Rowe has applied her marine biological and GIS expertise to biological data set development, as well as mapping habitats and biological resource distributions that could ultimately be affected by oil/chemical spills and development projects. She performs quantitative assessments and modeling of aquatic ecosystems and populations, pollutant transport and fates, and biological response to pollutants. The populations to which she applies these models include plankton, benthic invertebrates, fisheries, birds and mammals. She has analyzed data and has applied water quality, food web and ecosystem models to case studies in freshwater, marine and wetland ecosystems. She has a BA in Biology from DePauw University, and an MS in Marine Biology from the College of Charleston.

Deborah Crowley (RPS Ocean Science)

Deborah Crowley is a senior consulting environmental scientist and project manager at RPS. She has experience working on issues and projects related to various aspects of environmental science such as environmental data analysis, hydrodynamic and water quality modeling and analysis, coastal processes, oil and gas fate and transport assessment in the environment, operational discharge modeling and assessment, renewable energy project development assessment support, environmental impact assessment in coastal and marine environments and permitting and regulatory compliance analysis and support. Ms. Crowley's experience with renewable energy projects includes cable burial studies, wind resource assessment, climatology assessment including extremal analysis, wind turbine siting, turbine power production and site capacity analysis, turbine impacts assessment, turbine visualizations, regulatory, permitting and zoning review, planning and management of terrestrial met tower deployment and associated data management and analysis. Areas of experience include numerical modeling, model development and application, field program design and support, data analysis and visualization in MatlabTM and geospatial analysis in ArcGISTM. She has a BS in Mechanical Engineering from Worcester Polytechnic Institute and an MS in Civil & Environmental Engineering from University of Rhode Island.

John W. Joeckel (SEAConsult LLC)

Mr. Joeckel is an executive management professional with a broad-based background in multi-modal transportation, oil, chemical and gas industry sectors, and manufacturing and production. He has extensive experience in legislative advocacy and regulatory compliance, crisis and consequence management, emergency preparedness and response, including hands-on response as an Incident Commander on multiple major emergency incidents and development of all hazard response/crisis management programs and plans including training and exercises. He has experience in ports, waterways and facility maritime security vulnerability analysis and security plan development including personnel training and exercise. Mr. Joeckel has a BS in Maritime Transportation from SUNY Maritime College, as well as many years of training in oil spill response. He has been involved in response research and development and supervising many spill response operations, including the BP Gulf of Mexico Deepwater Horizon incident, the Enbridge Pipeline Michigan oil tar sands crude oil spill in the Kalamazoo River, and the Exxon Valdez spill in Alaska.

Andrew J. Wolford, PhD (Risknology, Inc.)

Dr. Wolford is founder and President of Risknology, Inc., a company specializing in risk analysis of hazardous facilities. He is an expert risk engineer with 29 years of experience. He has directed risk assessments on a diverse range of engineered systems including; offshore and onshore oil and gas installations, mobile offshore drilling units, marine and land-based transportation systems, chemical and nuclear fuel processing plants, nuclear power and test reactors, and the Space Shuttle program. He has a BA in Physics from Wittenberg University, a BA in Nuclear Engineering from Georgia Institute of Technology, and a ScD from Massachusetts Institute of Technology.

Keys to Summary Tables

The large amount of data generated in the modeling and analysis of the 72 hypothetical oil spill scenarios and five fire/explosion scenarios were summarized into tables that capture the key points. The more detailed SIMAP modeling results are presented in HROSRA Volume 4 and its appendices. The spill response considerations for these spill scenarios are presented in greater detail in HROSRA Volume 6. The fire/explosion scenarios are described in greater detail in HROSRA Volume 5.

Key to Spill Scenario Results Summary Tables

The table template below was used to summarize the results from the modeling and analysis of the 72 hypothetical spill scenarios. An annotated version is shown (broken into section components). The first section describes the scenario. This unique description defines each of the 72 scenarios.

	Location	Source	Volume	Oil Type	Season	Tide Stage
Scenario Description	Hypothetical release point or	51 51		Bakken crude, home heating oil	Spring-high flow	High or low tide at the
	stretch (for trains)	train	volume in barrels (bbl)	(HHO), heavy	Summer-low	spill location
				fuel oil, diluted	flow	
				bitumen, or	Winter-medium	
				gasoline	flow with ice	

The second section presents the probabilities of spills like the one in the hypothetical scenario. The purpose of this is to put a probabilistic perspective on the spill, which helps to provide a sense of the risk. The spill scenario, which may be very large, is relatively unlikely. The probabilities indicated are for spills of this type (source) and/or volume and *not for the specific location*. For example, it provides the likelihood of a spill of 150,000 bbl from an articulated tank barge (ATB) *somewhere along the river in the study zone*, not specifically at the proposed Kingston Anchorage. The probability that the incident would happen in exactly the same spot (and under exactly the same circumstances) as the hypothetical spill scenario are much smaller. The probabilities of the spill scenarios by volume are based on the likelihood of a spill *anywhere* along the study area of the Hudson River, not specifically in that location. In theory, the probability of spillage needs to be spread out over the 115-mile length of the river.

	Annual Probability An	ywhere in Hudson River	Historical Frequ (2000-	
	Spill of Type (Any Volume)	Spill of this Type and Volume	US	Hudson
Spill this type	Annual probability of spill from	Annual probability of spill in	Spill number of	1
	this type of source in Hudson	Hudson from this source and of this	this volume (or	this volume (or
Probability	regardless of volume	volume (or larger)	more) from this	
	(Any oil type involved)	(Any oil type involved)	source that	source that
			occurred annually in the	occurred annually in
			US 2000-2015.	Hudson River
			05 2000 2015.	2000-2015.

The third section specifies the environmental and conditional inputs into the modeling. If the same spill (volume and oil type) were to occur at a different time the outcome would be different. It is important to note that these are hypothetical spills. The release date/time does not indicate that a spill actually occurred on this date. The specific environmental conditions (weather, wind, currents, tide) on that specific historic

date were applied in the modeling. The results show what would have happened had there been a spill of that volume for that type of oil in that location.

	Lat/Lon	Release Rate	Release Date/Time	Run Duration	Winds	Water Temperature
	Release location	Spill rate as	Hypothetical	Oil spill	Direction and	Assumed
Conditions	in decimal	bbl/hour over the	release date/	trajectory and	speed at time	water
Conditions	degrees	course of number	time (weather,	fate model was	of release	temperature
		of hours	wind, currents	run for this		at time of
			on that date)	length of time		release
				(i.e., 30 days)		

The fourth section provides the mass balance or fate of the spilled oil after the duration of the model run of 30 days. It shows what happened to the oil after it spilled. The tables list the amount of oil on the water surface and in the water at 30 days post-spill. Typically, the maximum amount in these two environmental compartments occurs earlier in the spill simulation, such that little to none might be in these compartments after 30 days. The amounts in the atmosphere (i.e., evaporated), on shorelines and sediments, and degraded (by microbes and light-induced photo-degradation) increase in time as the processes leading to these fates ensue.

For each scenario, the sum of all the listed compartmental percentages adds up to, but may be less than, 100%. The remaining fate (completing the sum to 100%) is that amount of oil that has exited the modeled domain into New York Harbor.

				Mass Ba	lance	e at End of Mo	odel	Run (After 30	Days)	
	Fate	e Surface Atm			ere Water Column Sec		Sediment	Ashore	Degraded	
	%	Percent	of orig	ginal oil spil	led th	at is in each of	f the	ese categories at	the end of 30 day	'S
	bbl	Volume	(in bb	l) of origina	ıl oil s	spilled that is i	n ea	ch of these cate	gories at the end o	of 30 days
		S	Spatial	Extent of l	Expos	sure over Thr	esho	old (Up to 30 E	ays After Spill)	
SIMAP	Wat	ter (Volum	cological	Surface (Area x Days Exposed)			ys Exposed)	Shoreline (Length)		
Modeling Results		ole Oil mg/l) ¹		olved ² 1 mg/l)		ological ³ 0 g/m ²	So	cioeconomic (0.01 g/m ²)	Ecological ⁴ 100 g/m ²	Socioeconomic 1 g/m ²
	water d	verall volume (surface area times ater depth) affected to oncentrations of oil above the						e threshold	Total shore length (miles) oiled above threshold that could potentially cause ecological effects.	Total shore oiled above threshold for potential socio- economic impacts.

¹ 1 mg/l (1 milligram per liter) is the equivalent of 1 part per million (ppm).

 $^{^{2}}$ 0.001 mg/l = 1 microgram/l = 1 part per billion (ppb). Water column effects for both ecological and socioeconomic (e.g., seafood) resources could potentially occur at concentrations exceeding 1 ppb. A threshold of 1 ppb is typically used as a screening threshold for potential effects on sensitive organisms and early life stages (e.g., ichthyoplankton). This would be a conservative screening threshold for most adult and juvenile pelagic and demersal fish and invertebrates.

³ Mortality of birds on water has been observed at and above this threshold. Sublethal effects on marine mammals, sea turtles, and floating *Sargassum* communities are of concern.

⁴ This is a screening threshold for potential ecological effects on shoreline flora and fauna, based upon a synthesis of the literature showing that shoreline life has been affected by this degree of oiling. Sublethal effects on epifaunal intertidal invertebrates on hard substrates and on sediments have been observed where oiling exceeds this threshold. 14 *Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries*

The oil spill modeling summaries include the extent of oiling over specified thresholds. There are different thresholds for oil exposure above which ecological effects and socioeconomic (including cultural) impacts might occur. The basis for the thresholds is explained in HROSRA Volume 4 in the description of the model approach. The thresholds for socioeconomic impacts are much lower than those for potential ecological effects. There would be effects on tourism, property, etc. with even light amount of staining which occurs at much lower oil concentrations than would actually cause any ecological damage.

Note that all of these potential impacts assume that there has been no mitigation by spill response or protective booming strategies. In an actual spill situation, some of the oiled areas may be protected by timely and effective deployment of booms, assuming weather and current conditions are not counteracting the effectiveness. In addition, there may be some oil removal on the water surface that may reduce some of the spread and stranding of oil.

The fifth section specifies oil exposures on different types of shorelines and habitats that could cause some degree of ecological effects. Again, these oil exposures assume that there has been no mitigation by spill response or protective booming strategies. In an actual spill situation, some of the oiled areas may be protected by timely and effective deployment of booms, assuming weather and current conditions are not counteracting the effectiveness. In addition, there may be some oil removal on the water surface that may reduce some of the spread and stranding of oil.

	Sh	oreline Exposure by S	Shore Type (Miles over	r Ecological Threshol	d)				
	Bedrock	Unconsolidated Rock	Sand Beach	Mud or Timber	Artificial Shore				
	Miles of shoreline of	Miles of shoreline of different types oiled over the ecological threshold by shoreline type.							
Faclasical	Brackish/Estuarine Wetland Habitats Exposed (Miles over Ecological Threshold)								
Ecological Shoreline	Saltmarsh	Upper Intertidal Mix	Lower Intertidal Mix	Phragmites Wetland	Shrub/Scrub and Forested Wetland				
Exposures	Miles of brackish/estuarine wetland of different types oiled over the ecological threshold by wetland type.								
	Freshwater Wetland Habitats Exposed (Miles over Ecological Threshold)								
	Cattail Marsh	Upper Intertidal Mix	Lower Intertidal Mix	Phragmites Wetland	Shrub/Scrub and Forested Wetland				
	Miles of freshwater	wetland of different ty	pes oiled over the ecol	ogical threshold by we	tland type.				

The sixth section includes a brief summary of potential socioeconomic and cultural effects of the spill and/or the response operations for the specific scenario.⁵ Again, there may have been some mitigation of these effects with timely and effective spill response.

	Potential Socioeconomic Impacts from Spill and Response Operations
Socioeconomic	Potential socioeconomic impacts, including: water intakes potentially affected by oil in water column; port
Impacts	activities affected by presence of oil and/or response; tourism impacts by presence of oil and/or response;
	other notable impacts to cultural and socioeconomic features.

⁵ Impacts are noted by community or stretches of river from X community to Y community on the west and east shores. A list of the communities by river mile in the GRPs may be found in Appendix A of this volume. More detailed information about the riverfront and river vicinity features of the communities and towns can be found in HROSRA Volume 2.

¹⁵ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

This section describes the level of response activation that would be required as well as classifies the spill volume with respect to the National Contingency Plan (NCP) and USCG regulations. The NCP classifies all inland spills (including Hudson River spills) of 10,000 gallons (238 bbl) or larger as "major spills." The USCG considers a worst-case discharge (WCD) spill to be the largest foreseeable discharge – usually the size of the largest storage tank. An average most-probable discharge (AMPD) for a facility is 50 bbl or 1% of the WCD, whichever is smaller. A facility maximum most-probable discharge (MMPD) is 1,200 bbl or 10% of the WCD, whichever is smaller. For vessels, the WCD is the discharge of the vessel's entire fuel or cargo oil, whichever is greater. An AMPD is 50 bbl or 1% of the oil cargo, whichever is smaller. For a vessel with an oil capacity of 25,000 bbl or greater, the MMPD is 2,500 bbl. For vessel with a capacity of less than 25,000 bbl, the MMPD is 20% of the vessel's oil capacity. *Note that there are no current definitions for AMPD, MMPD, or WCD for rail spills*.

The amount of equipment specified by the tier response requirements merely specifies the minimum required. This does not mean that this is the only equipment that would be required to conduct an effective response operation. The areas specified in geographic response plans (GRPs) and geographic response strategies (GRSs) that would actually be affected based on the trajectory and spread of the oil are identified. This does not mean that other geographic areas would not prepare (deploy boom, etc.) if this hypothetical spill were to occur. In the event of an actual spill, the trajectory (path) and spread of the spill will not be accurately predicted.

The rail-related GRPs are more specifically designed for emergency response railroad-related spills. In the summary tables they only apply to the immediate area around the track on which the accident occurred. Any spillage into the river is dealt with in the river-related GRPs and GRSs. The oil may flow a considerable distance once it enters the river. Therefore, there may be many miles of river affected. For the GRPs and GRSs, the plans that would most likely be activated in the first seven days are noted. During this time there might be floating oil on the water surface that could be diverted or excluded from sensitive areas that are boomed according to the GRP or GRS.

In addition, the specific challenges with respect to protective booming, mechanical containment and recovery operations, and shoreline cleanup with this particular spill scenario are summarized.

Note that the response equipment described is the minimum that must be on site by the prescribed time. There would most likely be at least a minimal amount of equipment that would be deployed as soon as possible when the spill was discovered based on equipment available on the vessel, at the facility, or at the nearest response equipment cache. The amount of equipment described would not be sufficient for a full response to a worst-case discharge or even a moderately-large spill. The EDRC is not necessarily reflective of the actual amount of oil that could be recovered in field conditions.

	Response Equipment and Plan Activation									
	NCP and USCG	Tier Response Requirements					GRPs/ GRSs Activated (7 days)			
	Туре	Tier 1	Tier 1 (hrs)Tier 2 (hrs)Tier 3 (hrs)			Rail	Miles	River Miles		
Spill Response	NCP volume classification; USCG volume classification for response planning.	Required response times and response equipment for each stepped tier based on the National Contingency Plan. This is the minimum equipment that needs to be on scene at the spill scene in the specified time. Protective boom (ft) Containment boom (ft) Oil recovery equipment (bbl/day EDRC ⁶) Recovered oil storage (bbl)					nted ad GRSs ald be d in the ays of ponse.	River-related GRPs and GRSs that would be activated in the first 7 days of spill response.		
		Re	sponse (Overview: Expected	ed Outcomes and	Challenges				
	Protective Boo	oming	Mecha	nical Recovery	Shoreline Cle	anup Othe		er Challenges		
	Issues related to t protective (exclus diversionary) boo sensitive sites exp this spill scenario	sion and oming of bected in	mechan	elated to the ical recovery of ected in this spill o.	Issues related to t shoreline cleanup expected in this s scenario.	of oil	occur ii	Other challenges that may occur in this spill scenario (e.g., submerged oil).		

Key to Summary Tables for Fire/Explosion Scenarios

For each of five of the hypothetical scenarios, there was an additional scenario added that assumes that there is an ignition, which could cause a pool fire and/or a vapor cloud explosion. For these scenarios, an additional summary table is included. The first three sections are identical to the ones for the spill scenarios, as described above.

The fourth section provides the probabilities that there will be a pool fire and/or vapor cloud explosion *if there is first a spill in that location*, and the probability that there would be pool fire and/or vapor cloud explosion at all somewhere along the river. The second set of probabilities incorporates the probability that there would be a spill of this volume. It is important to remember that the probabilities of these fire/explosion events occurring first depend on the probability of there being a spill or release of oil. Then the conditions need to favor a fire or explosion, including a source of ignition or pressure buildup. The probabilities of a fire or explosion were calculated based on the conditions at the specific hypothetical spill locations. The probabilities of the spill scenarios by volume are based on the likelihood of a spill anywhere along the study area of the Hudson River, not specifically in that location. In theory, the probability of spillage needs to be spread out over the 115-mile length of the river.

	Pool Fire	Pool Fire	Vapor Cloud	Vapor Cloud Explosion
	Probability/Incident	Probability	Explosion/Incident	Probability
Fire/Explosion Probabilities	spill incident, there is a	of this size would occur	spill incident, there is a	Probability that a vapor cloud explosion of this size would occur somewhere on river.

The fifth section describes the general types of emergency response that might be required in the hypothetical scenario, as well as the extent of the required evacuation zone. Any relevant health and safety issues important to the response are also summarized.

⁶ Effective daily recovery capacity.

¹⁷ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

Fire/Explosion	Emergency Response	Evacuation Zone	Health/Safety Issues
D	Emergency response actions.	Recommendations for evacuation.	Potential health/safety issues for
Response		Recommendations for evacuation.	responders and public.

	Flammable		Impa	acts from Fire (A	cres)		
	Distance	Total	Residential	Commercial	Industrial	Public Use	
Distance in feet	Acres affected	Acres affected Acres affected Acres affected Acres					
Safety Impacts	Downwind	Impacts from Explosion (Acres)					
	Distance	Total	Residential	Commercial	Industrial	Public Use	
	Distance in miles	Acres affected	Acres affected	Acres affected	Acres affected	Acres affected	

The sixth section summarizes the specific safety impacts of a fire or explosion.

Sequential Probabilities for Scenarios

The probability that any one of the hypothetical scenarios with or without fires and explosions would occur on the Hudson River depends on a series of probabilities.

When several independent events need to occur for a final outcome to occur, the probabilities of each of the independent events are multiplied together. For example, in dice games, the probability of getting two "threes" when rolling dice is the probability of getting a "three" on the first die multiplied by the probability of getting a "three" on the second die. There is a 1 in 6 probability of getting a "three" with each die. The probability gets smaller with each added die.

"Three" on one die = 1/6 = 0.167 (a 1 in 6 chance)

"Three" on two dice = (1/6) times (1/6) = 0.0278 (a 1 in 36 chance)

"Three" on three dice = (1/6) times (1/6) times (1/6) = 0.0046 (a 1 in 216 chance)

The different events can have different probabilities that also can be multiplied together to calculate the probability of all of the events occurring. For example, the probability of rolling a "six" on two dice and also getting a "heads" on a coin toss is:

"Six" on two dice plus "heads" = (1/6) times (1/6) times (1/2) = 0.014 (a 1 in 72 chance)

This chance is with each roll/toss opportunity. If the action is repeated many times, the probability increases.

For the spill and fire/explosion scenarios, a sample series of hypothetical probabilities is shown in Figure 1. This demonstrates the sequential probabilities that need to be multiplied to determine the likelihood of a tanker fire or explosion somewhere along the Hudson River for a single tanker trip.

This *hypothetical* example shows that the probability of an accident with a tanker is 0.0035 each time the tanker transits the Hudson River. Then there is a 0.19 chance that the accident will result in a spill of any volume – small to large. Then, there is a 0.0001 chance that the spill will be a large (150,000 bbl) incident. Then there is a 0.10 chance that there is an ignition that causes the spilled oil to burn and/or explode. This series of probabilities are multiplied together to give a 0.000000007 chance of a tanker fire

or explosion each time a loaded tanker takes a trip up or down the river. That's a 1 in 154 million chance. But, this is for each time there is a tanker trip.

If there are 1,000 loaded transits per year, this increases the *annual* probability to 1 in 154,000. Over 25 years, this means a probability of 1 in 6,000. But, one also needs to consider that there are 115 miles of the Hudson River between Spuyten Duyvil and the Federal Lock at Troy. If the incident is just as likely to occur anywhere along the 115 miles and the effect of such a fire/explosion incident is felt in a two-mile radius, the probabilities can be roughly divided into about 58 separate zones. The probability of the incident happening in any one specific zone during those 25 years is about 1 in 348,000.

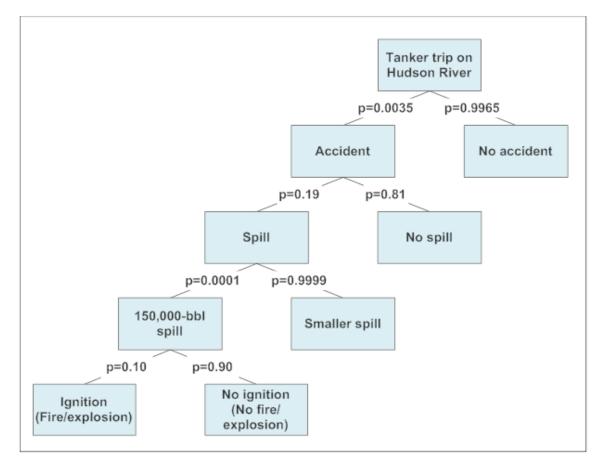


Figure 1: Example Hypothetical Probability Sequence for Large Tanker Fire/Explosion⁷

⁷ This figure demonstrates the way in which sequential probabilities are multiplied together. The probability values are hypothetical.

¹⁹ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

Albany 155,000-bbl Bakken Crude Tanker Loading Accident

Scenario	Loca	tion	So	ource	V	olume		Oil Ty	ype	Season		Tide Stage			
Description	Port of A	Albany			155	5,000 bbl	Ba	akken o	crude	Spring		High			
6 : 11		Annu	al Proba	ability Any	where	in Hudson	Rive	er		udeSpringHigHistorical Anuul Frequ (2000-2015)South / light (<10 kts)					
Spill Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volun	ne			Hudson			
	One Port of Albany Tanker loading accident (dock) 155,000 bbl Bakken crude Spring Intervention Annual Probability Anywhere in Hudson River Historical Annual (2000-201 Spill of Type (Any Volume) Spill of Type and Volume US 0.732 0.000015 0 0.732 0.0000015 0 0.732 0.0000015 0 0.734 Release Rate Model Run Dute/Time Winds T 42.61673 38.750 bb/hr 6.00am (<10 kts)	0													
Conditions					Da	te/Time						Water Temperature			
			,	r 4 hrs	6	:00am			<u> </u>	(<10 kts)	t	46°F			
				Mass Ba	alance		lode	Run	(After 3	0 Days)					
	Fate			-		Colum	1					Degraded			
CINA D												10.9%			
SIMAP Modeling	bbl	15	-	· · · ·		,		I	·			16,932			
Results			-		-				-						
			-	0		-	-	-			(Length) Socioeconomic				
											(1 g/m^2)				
	704,875	mil gal	297,08	34 mil gal	83	mi ² -days	8	4 mi ² -	days	200 mi		240 mi			
	Bedrock				ated	Sand	Beac	h	Mud	or Timber	А	rtificial Shore			
	21.3 mi			90.8 mi		1.3	mi		6	0.7 mi		0 mi			
Ecological		Brac					-		-						
Shoreline	Salt	marsh	U		tidal			idal			rub/Scrub and rested Wetland				
Exposures	0.	1 mi		0 mi		0.1	mi		(0.6 mi		0 mi			
		ŀ													
	Catta	il Marsh	U		tidal			idal				rub/Scrub and rested Wetland			
	2.	9 mi		15 mi		5.4	mi			1.5 mi		0.2 mi			
						-		-	-	-					
Socioeconomic Impacts	days; ev. of popul above th would b more hea shorefro shore fro Water in Bethlehe Ewen M	acuations ated area e level of e affected avily oile nt real es om Rhine takes tha em Mile	and press and press could of concern f concern l by oil, d (about tate wou beck to t may be 137; Cas	cautionary cause effec n for socioe including r 200 miles ild be most Rensselaer e affected in tleton Mile	clearan ts on co econom esidue). Rive affecte . Addit nclude: 136; U	nce zones m ommunities nic effects; sl and odor. So rside parks, ed on the we ional impact OGS Mile Jlster Mile 9	ight c and b horef CAT marir st sho is ma 145; 2 6; Ro	cause f pusines ront m operat nas, be ore fro y be ez AMRI ondout	1.5 mi0.2 miill and Response Operationsny and throughout river for at least severaluse further impacts to vessel traffic. Evacuainesses. 240 miles of shoreline would be ont marinas, beaches, parks, and real estateverations and cleanup would be focused ona, beaches, industry, commercial property, afrom Kingston to Albany, and on the eastve experienced in other towns along the rivMRI Rensselaer Mile 144; PSE&G Mile 14dout Creek & Rhinebeck Village Mile 91;	ffic. Evacuation would be oiled real estate focused on areas l property, and on the east long the river. &G Mile 141; e Mile 91; Port					

	2					/			
			R	esponse Equipment	and Plan Activation				
Spill Response	NCP and		Tier	Response Requirer	nents	GRPs/ GRSs Activated (7 days)			
	USCG Type	Tier 1 (24 hrs)		Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail Miles	River Miles		
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n/a	55 river miles Mile 90-145 2016-47 to 2016-6		
			-	Overview: Expecte	d Outcomes and Cha	allenges			
	Protective H	Booming	Mech	anical Recovery	Shoreline Cleanu	p Othe	er Challenges		
Spill Response	River currents 0.3 kts on floo kts on ebb, wil boom effective containment an diversionary b configurations angled to preve entrainment an over; exclusion deflection cont to be used to p sensitive areas	between d and 0.8 l reduce eness, nd oom to be ent d splash n and figurations rotect	45% ev rapid sp reduce be reco mechar floating skimme shorelin boom a	vaporation and preading will amount that can vered nically; mobilize g self-propelled ers; set up ne containment ureas with n-trucks and	Approximately 6% o shoreline. Perform SCAT; wetland flush some substrate remov due to penetration on sandy beaches; oiled dock structures; oiled debris removal.	n Flamma Bakken ing; significa val high ber area aro Potentia d oil in hi areas; w may be disturba during r cause ef for entra in water to water kill cond	bility during a spill is a ant danger, as are izene vapors in and the spill. I for submerged gh-sediment etland access challenge; ance of wetlands esponse may fects; potential inment of 37% column leading intake and fish cerns; perform lumn tracking, monitoring.		

Albany 155,000-bbl Bakken Crude Spill (Spring-High Tide) Response

Sconario	Loca	tion				olume		·		Season		Tide Stage
Description	Port of A	Albany			155	5,000 bbl	Ba	ıkken c	crude	Spring		Low
Spill		AlbanyTanker loading acident (dock)155,000 bblBakken crudeSpringLowAnnual Probability Anywhere in Hudson RiverHistorical Annual Frequency (2000-2015)Historical Annual Frequency (2000-2015)ill of Type (Any Volume)Spill of Type and VolumeUSHudson 0.732 0.0000015 0 0 LowRelease RateRelease Date/TimeModel Run DurationWindsWater Temperature 1673 $38,750$ bbl/hr 6 April 2015 30 daysSouth / light (<10 kts) $46^\circ F$ Mass Balance at End of Model Run 0.1% Mass Balance at End of Model Run (After 30 Days)DegradedSurfaceAtmosphereWater ColumnSedimentAshoreDegraded 0.1% 46.9% 34.7% 1.2% 6.9% 10.2% 215 $72,620$ $53,740$ $1,901$ $10,655$ $15,741$ Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill)r (Volume) - EcologicalSurface (Area x Days Exposed)Shoreline (Length)le Oil $0,01$ mg/l) 0.01 mg/l $(10 g/m^2)$ $(0.01 g/m^2)$ $(100 g/m^2)$ init gal $281,088$ mil gal 92 mi ² -days 94 mi ² -days 211 mi 249 miShoreline Exposure by Shore Type (Miles over Ecological Threshold) Mud or TimberArtificial Shore										
Probability	Spi	ll of Typ	my Tanker loading accident (dock) 155,000 bbl Bakken crude Spring Low nnual Probability Anywhere in Hudson River Historical Annual Frequ (2000-2015) Historical Annual Frequ (2000-2015) Type (Any Volume) Spill of Type and Volume US Hudson (2000-2015) 0.0000015 0 0 Release Rate Release Date/Time Model Run Duration Winds Wat Temper 0 38,750 bbl/hr over 4 hrs 6 April 2015 1:00an 30 days South / light (<10 kts)	Hudson								
Spill		0.7	732			0.000	0015	5		0		0
Conditions	Lat/				Da	te/Time						
Conditions	42.61 -73.70			r 4 hrs	1:0)0am				(<10 kts)		46°F
				Mass Ba	alance		odel	Run (After 3	0 Days)		1
	Fate	Surf	face	Atmosp	here		1	Sec	diment	Ashor	e	Degraded
	%	0.1	%	46.99	%	34.7%		1	1.2%	6.9%		10.2%
								10,655	5	15,741		
								-				
	702,725				· · · ·	<u> </u>						
	Bedrock				ated	Sand	Beac	h	Mud	or Timber	А	rtificial Shore
	21.9 mi		98.3 n	ni	1.9	mi			63.9 mi		0 mi	
Ecological		Brac	etland	Habitats Ex	pose	d (Mil	es over	Ecological Th	old)			
Shoreline	Salt	marsh	U		tidal			idal				
Exposures	0.	1 mi		0 mi 0.2 mi			0.8 mi		0 mi			
		ŀ								-		
	Catta	il Marsh	U		tidal			idal				rub/Scrub and rested Wetland
	3.	1 mi										0.4 mi
			Potenti	ial Socioec	onomi	c Impacts fr	om S	Spill ar	nd Resp	onse Operatio	ons	
Socioeconomic Impacts	Response operations may cause major impacts to ports in Albany and throughout river for at least several days; evacuations and precautionary clearance zones might cause further impacts to vessel traffic. Evacuation of populated areas could cause effects on communities and businesses. 249 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and real estate would be affected by oil, including residue and odor. SCAT operations and cleanup would be focused on areas more heavily oiled (about 211 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Kingston to Albany, and on the east shore from Rhinebeck to Rensselaer. Additional impacts may be experienced in other towns along the river. Water intakes that may be affected include: OGS Mile 145; AMRI Rensselaer Mile 144; PSE&G Mile 141; Bethlehem Mile 137; Castleton Mile 136; Ulster Mile 96; Rondout Creek & Rhinebeck Village Mile 91; Port											

Albany 155,000-bbl Bakken Crude Spill (Spring-Low Tide) Effects

,	·				<u> </u>	/						
			R	esponse Equipment	and Plan Activatio	n						
	NCP and		Tier	Response Requiren	nents	G	GRPs/ GRSs Activated (7 days)					
	USCG Type	Tier 1 (24	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rai	Miles	River Miles				
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/d 3,750 bbl s	300 per system1,000 ft + 300 pe skimming system 3,750 bbl/day		25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n/a		55 river miles Mile 90-145 2016-47 to 2016-6				
	3,750 bbl storage 7,500 bbl storage 15,000 bbl storage 2010-0 Response Overview: Expected Outcomes and Challenges											
	Protective H	Booming	Mecl	nanical Recovery	Shoreline Clear	-	Othe	er Challenges				
Spill Response	0.3 kts on floo kts on ebb, wil boom effective containment at diversionary b configurations angled to preve entrainment an	Il reduce eness, nd oom to be ent	rapid s reduce be reco mecha floatin skimm shoreli	vaporation and spreading will a amount that can overed nically; mobilize g self-propelled ters; set up ine containment areas with	Approximately 7% end up on shorelind Perform SCAT; we flushing; some sub removal due to penetration on sand beaches; oiled docl structures; oiled de removal.	 Bakken spill is a significant danger, as a high benzene vapors in area around the spill. y Potential for submerge oil in high-sediment 						
	over; exclusion deflection com to be used to p sensitive areas	figurations rotect	vacuun skimm	n-trucks and ters.			during re cause eff for entra in water to water kill conc water co	nce of wetlands esponse may fects; potential inment of 35% column leading intake and fish eerns; perform lumn tracking, nonitoring.				

Albany 155,000-bbl Bakken Crude Spill (Spring-Low Tide) Response

	Loca			ource	-	olume		Oil Ty		Season		Tide Stage		
Scenario Description	Port of .		Tanke	er loading ent (dock)		5,000 bbl		akken c	_	Summer		High		
631		Annu		× /	where	e in Hudson	Rive	er			Immer High ical Annual Frequen (2000-2015) S Hudso S Hudso 0 0 nds Tempera light 77°F shore Degrad 0% 15.2% 475 23,570 er Spill) Socioecon horeline (Length) ogical ogical Socioecon g/m²) c (1 g/n) ni 18 mi eshold) 0 mi er Artificial Shot 0 mi al Threshold) Forested Wetl 0 mi nershold) shrub/Scrub a Forested Wetl 0 mi nershold) er for at least several 0 mi er for at least several 0 mi erations erations			
Spill Probability	Spi	ll of Typ	e (Any	Volume)	S	pill of Type	and	Volun	ne	US		Hudson		
, i		0.7	/32			0.000	00015	5		0		0		
Conditions	Lat/	Lon	Relea	ase Rate	Da	Release ite/Time		/lodel l Durati		Winds		Water Temperature		
Conditions	42.61 -73.7		-	0 bbl/hr r 4 hrs		August 1:30pm		30 da	ys	South / light (<10 kts)	77°F			
				Mass Ba	alance	at End of M	lode	l Run (After 3	Days)				
	Fate	FateSurfaceAtmosphereWater ColumnSedimentAshoreDegrade										Degraded		
	%	0.1% 50.4% 32.9% 0.4% 1.0%							15.2%					
SIMAP	bbl	83	3	78,174	4	51,065		(533	1,475		23,570		
Modeling Results		Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill)												
		r (Volum				face (Area x	-	-			-			
	Who (1 n	le Oil ng/l)		solved Ecological Socioeco 01 mg/l) (10 g/m ²) (0.01 g								Socioeconomi c (1 g/m ²)		
	3,669 r	nil gal	2,711	mil gal	27 :	mi ² -days	2	7 mi ² -c	lays	ys 12 mi 18				
				-	•	Shore Type	e (Mi	les ove	r Ecolog	ical Thresho	ld)			
	Be	drock	ι	Jnconsolid Rock	ated	Sand 1	Beac	h	Mud	or Timber	A	rtificial Shore		
	0	mi		9.5 mi		0 n				6 mi				
Ecological		Brac					-							
Shoreline	Salt	marsh		pper Inter Mix	tidal	Lower In M		idal		agmites etland				
Exposures	() mi		0 mi		0 1	mi			0 mi		0 mi		
		ŀ								ogical Thres				
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		rub/Scrub and rested Wetland		
	() mi		0 mi		0 1	mi			0 mi		0 mi		
						-		-	-	onse Operati				
Socioeconomic										eaches, parks,				
Impacts										cleanup woul ustry, comme		ocused on areas		
										hem to Alban				
	shore fro	om Schod	lack to T	Troy. Addit	ional ii	mpacts may	be ex	perien	ced in ot	her towns alou	ng the	e river. Water		
										e 144; PSE&(uch or all of t				
	1 iduition	iai piecai	<i>scionary</i>	noning duv	1501103	, Julu likel	,	monut		uen or un or t		v1.		

Albany 155,000-bbl Bakken Crude Spill (Summer-High Tide) Effects

			Re	sponse Equipment	and Plan Activation	1				
Spill Response	NCP and		Tier	Response Require	ments	G	GRPs/ GRSs Activated (7 days)			
	USCG Type	Tier 1 (2	24 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rai	il Miles	River Miles		
	Major WCD	25,000 ft 1,000 ft + skimming 1,875 bbl 3,750 bbl	300 per system /day	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n/a		10 river miles Mile 145-155 2016-6 to 2016-1		
		R	esponse	Overview: Expecte	ed Outcomes and Ch	alleng	es			
	Protective Bo	ooming	Mech	anical Recovery	Shoreline Clean	սթ	Other	· Challenges		
Spill Response	River currents b 0.3 kts on flood kts on ebb, will boom effectiver containment and diversionary bo configurations t angled to preven entrainment and over; exclusion deflection confii to be used to pro- sensitive areas.	and 0.8 reduce ness, d om o be nt l splash and gurations	rapid sp reduce a be reco mechan floating skimme shorelin boom a	ically; mobilize self-propelled ors; set up ne containment reas with I-trucks and	Only about 1% is anticipated to cause shoreline contamina Perform SCAT; wet flushing; some subst removal due to penetration on sandy beaches; oiled dock structures; oiled deb removal.	land trate	Bakken s significar high benz area arou Potential oil in higl areas; we may be cl disturban during res cause effe for entrai in water co to water i kill conce	tt danger, as are zene vapors in nd the spill. for submerged n-sediment tland access		

Albany 155,000-bbl Bakken Crude Spill (Summer-High Tide) Response

Scenario	Loca	tion	So	ource		olume		Oil Ty	ре	Season		Tide Stage	
Description	Port of A	Albany		er loading ent (dock)	15	5,000 bbl	В	akken c	rude	Summer	SummerHistorical Anual F (2000-2015USUSTe0Te0TeSouth / light (<10 kts)TeSouth / light (<10 kts)TeSouth / light 		
Spill		Annı	ıal Prob	ability Any	where	e in Hudson	Rive	r			LowLowColspan="2">Colspan="2">Colspan="2">Colspan="2"Hudse0HudseIsWate Temperaight77°FIsOFDegra0%16.89226,10Spill)Isocioeco (m²)(1 g/nIn (Length)icalSocioeco (n²)(1 g/nIn Threshold)Shrub/ScrubForested We 0 miShrub/ScrubForested We 0 miIsociacion of e would be oiled ab eal estate would be oole ab eal estate would be or at least several da fic. Evacuation of e would be oiled ab eal estate would be or porperty, and shoref		
Probability	Spi	ill of Typ	e (Any V	Volume)	S	pill of Type a	and	Volume	e	US	ical Annu (2000- S S Ital Shore Shore Shore Shore Shoreline ogical g/m ²) ni Shoreline ogical g/m ²) ni Shoreline shold) Shoreline shold) Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline shold Shoreline Shorelin	Hudson	
		0.7	732			0.000	0001	5		0		0	
Conditions	Lat/l			ase Rate	Da	Release ate/Time		Model I Durati				Water Temperature	
	42.610 -73.76			0 bbl/hr r 4 hrs		1gust 2015 5:00am		30 day	/S		t	77°F	
				Mass B	alance	at End of M	lode	l Run (After 30	Days)			
	FateSurfaceAtmosphereWater ColumnSedimentAshoreDegrad									Degraded			
	%	0.0	%	50.7%	b	31.3%		0	.3%	0.9%		16.8%	
SIMAP Modeling	bbl	68	3	78,55	8	48,482			393	1,392		26,107	
Results			Spatia	al Extent of	Expo	sure over Th	resh	old (Up	p to 30 D	ays After Spi	ill)		
		r (Volum		0				Days Exposed)		Shoreline (Length) Ecological (100 g/m²) Socioecono (1 g/m²)			
	Whol (1 n			ssolved 01 mg/l)	(cological 10 g/m²)		ocioeco (0.01 g	/m ²)		Socioeconomic (1 g/m ²)		
	3,070 n	nil gal	2,121	mil gal	30	mi ² -days	3	$0 \text{ mi}^2 - d$	ays	11 mi	17 mi		
				-	-	Shore Type	e (Mi	les over	r Ecologi	cal Threshol	d)		
	Be	drock	t	Unconsolida Rock	ated	Sand I	Beac	h	Mud	or Timber	A	Artificial Shore	
	0) mi		9.2 mi		0 r	ni		2	.2 mi		0 mi	
Ecological		Bra					-						
Shoreline	Salt	marsh	U	pper Inter Mix	tidal	Lower II M		idal		agmites etland		nrub/Scrub and prested Wetland	
Exposures	C) mi		0 mi		0 r				0 mi			
			Freshw	ater Wetla	nd Ha	bitats Expos	ed (N	Miles ov	ver Ecolo	gical Thresh	old)		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		nrub/Scrub and prested Wetland	
	C) mi		0 mi		0 r	ni			0 mi		0 mi	
						-		-	-	-			
Socioeconomic Impacts	evacuation populate the level affected heavily of real estat Schodaci be affect	ons and p d areas co of conce by oil, in- biled (abo te would k to Troy ed includ	recaution ould cause rn for so cluding r out 11 mi be most . Addition	nary clearar se effects or cioeconomi residue and iles). Rivers affected on onal impacts Mile 145; A	nce zon n comr c effec odor. S ide par the we s may b MRI I	nes might cau nunities and l ets; shorefron SCAT operati ets, marinas, est shore from the experience	se fu busin t man ions beac beac a Bet cd in ile 14	orther in nesses. 1 rinas, be and clea hes, ind hlehem other to 44; PSE	npacts to 7 miles of eaches, p anup wou lustry, co to Alban owns alor &&G Mile	vessel traffic. of shoreline w arks, and real ild be focused mmercial prop y, and on the	Evac ould estat on a perty east	cuation of be oiled above e would be reas more , and shorefront shore from intakes that may	

Albany 155,000-bbl Bakken Crude Spill (Summer-Low Tide) Effects

				Kesponse Equipme	nt and Plan Activatio		PPs/ CPS	Ss Activated		
Spill Response	NCP and		Tie	r Response Require	ments	U	(7 days)			
	USCG Type	Tier 1 (24 hrs)		Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles		
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n/a		10 river miles Mile 145-155 2016-6 to 2016-1		
			Respons	se Overview: Expec	ted Outcomes and C	hallenge	s			
	Protective B	0		hanical Recovery	Shoreline Clea			er Challenges		
Spill Response	River currents l 0.3 kts on flood kts on ebb, will boom effective: containment an diversionary bc configurations angled to preve entrainment and over; exclusion deflection confi to be used to pr sensitive areas.	and 0.8 reduce ness, d oom to be ent d splash and igurations rotect	rapid s reduce recove mobili propel up sho boom	vaporation and spreading will e amount that can be ered mechanically; ize floating self- led skimmers; set oreline containment areas with vacuum- and skimmers.	About 1% is antici to cause shoreline contamination. Per SCAT; wetland flu some substrate rem due to penetration sandy beaches; oild structures; oiled de removal.	form shing; noval on ed dock	Bakken s significa high ben area arou Potential oil in hig areas; we may be c disturbar during re cause eff for entra water co water int concerns	nt danger, as are zene vapors in und the spill. I for submerged th-sediment etland access challenge; nee of wetlands esponse may Sects; potential inment of 31% in lumn leading to ake and fish kill s; perform water racking, and air		

Albany 155,000-bbl Bakken Crude Spill (Summer-Low Tide) Response

Scenario	Loca			ource	· · ·	olume		Oil Ty		Season		Tide Stage
Description	Port of A	Albany		r loading nt (dock)	15	5,000 bbl	В	akken c	crude	Winter		High
Spill		Annu	ial Prob	ability Any	where	e in Hudson I	Rive	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any V	Volume)	S	pill of Type a	and `	Volum	e	US		Hudson
		0.7	732			0.000	00015	5		0		0
Conditions	Lat/I			ase Rate	Da	Release ate/Time		Model l Durati		Winds		Water Temperature
Conditions	42.61 -73.70			0 bbl/hr r 4 hrs	3	uary 2015 :00pm		30 day		Light and variable (<5 k	cts)	33°F
				Mass B	alance	at End of M	Iode	Run (After 30	Days)		
	Fate	Surf	ace	Atmospl	here	Water Column	l	Sec	liment	Ashore	e	Degraded
	%	18.	0%	48.99	%	9.5%		1	.1%	17.4%		5.1%
SIMAP Modeling	bbl	27,	923	75,79	1	14,764		1	,656	26,970)	7,897
Results			Spatia	l Extent of	Expo	sure over Th	resh	old (Uj	p to 30 I	Days After Spi	ll)	
		r (Volum		-		face (Area x		-				(Length)
	$(1 \text{ mg/l}) \qquad (0.001 \text{ mg/l}) \qquad (10 \text{ g/m}^2) \qquad (0.01 \text{ g/m}^2) \qquad (100 \text{ g/m}^2) \qquad (1 \text{ g/m}^2)$									Socioeconomic (1 g/m ²)		
	178,056 mil gal 131,807 mil gal 292 mi ² -days 345 mi ² -days 188 mi 208 mi									208 mi		
				-	•	Shore Type	e (Mi	les ove	r Ecolog	ical Threshold	d)	
	Be	drock	ι	Jnconsolida Rock	ated	Sand I	Beac	h	Mud	or Timber	A	Artificial Shore
	18	.6 mi		68 mi		2.1				4.3 mi		0 mi
Ecological		Bra					_			Ecological Th		
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idai		ragmites /etland		nrub/Scrub and prested Wetland
Exposures	0	mi		0.3 mi		0.1	mi			0 mi		0 mi
			Freshwa	ater Wetla	nd Ha				ver Ecol	ogical Thresh		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower II M		idal		ragmites /etland		nrub/Scrub and prested Wetland
	3.	.5 mi		22.9 mi		6.3	mi			1.3 mi		0.2 mi
						-		-	-	onse Operatio		
										out river for at		
										vessel traffic.		d be oiled above
										arks, and real		
Socioeconomic	affected	by oil, in	cluding 1	esidue and	odor. S	SCAT operati	ions	and clea	anup wo	uld be focused	on a	reas more
Impacts												y, and shorefront
										and on the eas		
										E&G Mile 141		
	137; Cas	tleton Mi										or much or all of
	the river.	•										

Albany 155,000-bbl Bakken Crude Spill (Winter-High Tide) Effects

					nt and Plan Activati	ion				
	NCP and			Response Require				RSs Activated ' days)		
	USCG Type	Tier 1 (24	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail N	/iles	River Miles		
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n/a	a	35 river miles Mile 145-110 2016-6 to 2016-32		
		Response Overview: Expected Outcomes and Challenges								
	Protective B	Booming	Mec	hanical Recovery	Shoreline Clea	anup	0	er Challenges		
Spill Response	River currents 0.3 kts on flood kts on ebb, will boom effective containment and diversionary bc configurations angled to preve entrainment and over; exclusion deflection confi to be used to pr sensitive areas. ice conditions of boom deployme	I and 0.8 I reduce ness, doom to be ent d splash and igurations rotect Potential can impact	rapid s reduce recove mobili propel up sho boom trucks Potent may n	evaporation and spreading will e amount that can be ered mechanically; ize floating self- lled skimmers; set oreline containment areas with vacuum- and skimmers. tial ice conditions egatively impact unical recovery ions	About 17% is anti to cause shoreline contamination. Pe SCAT; wetland fl some substrate ren due to penetration sandy beaches; oil structures; oiled d removal.	erform ushing; moval on led dock	Bakke signif high t area a Poten oil in areas; be cha of wel respon effect: entrai water water conce	Other Challenges mability during a ken spill is a ificant danger, as are benzene vapors in around the spill. ntial for submerged n high-sediment s; wetland access may hallenge; disturbance etlands during onse may cause cts; potential for ainment of 10% in er column leading to er intake and fish kill eterns; perform water mn tracking, and air		

Albany 155,000-bbl Bakken Crude Spill (Winter-High Tide) Response

Scenario	Loca	tion	So	ource		olume		Oil Ty	ре	Season		Tide Stage
Description	Port of A	Albany		r loading nt (dock)	15	5,000 bbl	В	akken c	rude	Winter		Low
Spill		Annu	ial Prob	ability Any	ywhere	in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any V	Volume)	S	pill of Type	and	Volume	e	US		Hudson
		0.7	732			0.000	0001	5		0		0
Conditions	Lat/	-		ase Rate	Da	Release ate/Time		Model I Durati		Winds		Water Temperature
	42.61 -73.7) bbl/hr 4 hrs	1	nuary 2015 0:00pm 30 day			/s Light and variable (<5 kts)			33°F
				Mass B	alance	at End of M	lode	l Run (After 30	Days)		
	Fate	Surf	ace	Atmospl	here	Water Column	l	Sec	liment	Ashore	e	Degraded
	%	17.	7%	50.59	%	10.0%		().5%	17.8%)	3.4%
SIMAP Modeling	bbl	27,	508	78,34	8	15,555			710	27,547	7	5,331
Results			Spatia	l Extent of	f Expo	sure over Th	resh	old (Up	p to 30 I	Days After Spi	ll)	
	Wate	r (Volum	·	0		face (Area x						(Length)
	Who (1 n	le Oil		ssolved 01 mg/l)		cological 10 g/m ²)		ocioeco (0.01 g		Ecological (100 g/m ²		Socioeconomic (1 g/m ²)
	198,378			8 mil gal		mi ² -days		$\frac{(0.01 \text{ g})}{49 \text{ mi}^2}$		186 mi	,	205 mi
				-		· ·			-	gical Threshold	d)	
	Be	drock	τ	Jnconsolida Rock	ated	Sand	Beac	h	Mud	or Timber	A	artificial Shore
	1	8.3 mi		67.6 m	i	2.	1 mi			63.3 mi		0 mi
Ecological		Bra	ckish/Es	stuarine W	etland		_		es over l	Ecological Th		
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		nrub/Scrub and prested Wetland
Exposures	() mi		0 mi		0.1	mi			0 mi		0 mi
										ogical Thresh		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		nrub/Scrub and prested Wetland
	3	.9 mi		22.6 mi		6.3	mi			1.4 mi		0.4 mi
										onse Operatio		
										nout river for at		
										vessel traffic. s of shoreline v		d be oiled above
										barks, and real		
Socioeconomic	affected	by oil, in	cluding r	esidue and	odor. S	SCAT operat	ions	and clea	anup wo	uld be focused	on a	reas more
Impacts												y, and shorefront
										es, and on the e		hore from Vater intakes that
										G Mile 141; Be		
												ich or all of the

Albany 155,000-bbl Bakken Crude Spill (Winter-Low Tide) Effects

USC USC USC P Rive 0.3 I kts o boor cont	Major WCD 25, 1,0 ski 1,8	Kier 1 (24 hrs) ,000 ft boom ,000 ft + 300 p imming syster 375 bbl/day 750 bbl storag Resp ning veen 49% d 0.8 spred	25,000 ft boom er 1,000 ft + 300 per n skimming system 3,750 bbl/day	ements 25,0 25,0 1,00 skim 7,50 15,0 pected y id	s ier 3 (72 hrs) 000 ft boom 00 ft + 300 per nming system 00 bbl/day 000 bbl storage	GRI Rail Mi n/a Challenges Cleanup nticipated	(7 d iles Ot Flamn	0	
P Rive 0.3 I Spill Response boon cont	Major WCD Protective Boom er currents betw kts on flood and	,000 ft boom 000 ft + 300 pi imming syster 375 bbl/day 750 bbl storag Resg ning 1 veen 49% d 0.8 spre	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage conse Overview: Exp Mechanical Recovery 6 evaporation and rapic ading will reduce amo	25,0 1,00 skim 7,50 15,0 pected y id	000 ft boom 00 ft + 300 per nming system 00 bbl/day 000 bbl storage 00 tcomes and Shoreline C About 17% is a	n/a Challenges Cleanup Inticipated	iles Ot Flamn	River Miles40 river milesMile 145-1052016-6-2016-36	
Spill Response kts of boon cont	Major WCD Protective Boon er currents betw kts on flood and	000 ft + 300 pr imming syster 875 bbl/day 750 bbl storag Resp ning veen 49% d 0.8 spress	er 1,000 ft + 300 per skimming system 3,750 bbl/day e 7,500 bbl storage conse Overview: Exp Mechanical Recovery 6 evaporation and rapi cading will reduce amo	1,00 skim 7,50 15,0 pected y id	00 ft + 300 per nming system 00 bbl/day 000 bbl storage Outcomes and Shoreline C About 17% is a	Challenges Cleanup Inticipated	Flamm	Mile 145-105 2016-6-2016-36 ther Challenges	
Spill Response Rive 0.3 l kts o boor cont	Protective Boon er currents betw kts on flood and	Resp ning 1 veen 49% d 0.8 spre	bonse Overview: Exp Mechanical Recovery be evaporation and rapi ading will reduce amo	pected y id	Outcomes and Shoreline C About 17% is a	Cleanup Inticipated	Flamm	0	
Spill Response Rive 0.3 l kts o boor cont	er currents betw kts on flood and	veen 49% d 0.8 spre	b evaporation and rapi eading will reduce amo	id	About 17% is a	nticipated	Flamm	0	
Spill Response 0.3 l kts o boor cont	kts on flood and	d 0.8 spre	ading will reduce amo			1		nability during a	
conf angl entra over defle to be sens ice c	om effectiveness, tainment and ersionary boom figurations to be led to prevent rainment and spl r; exclusion and lection configura be used to protec sitive areas. Pote conditions can it om deployment.	e con lash skir lash skir l Pote ations neg ct mec ential ope	chanically; mobilize ting self-propelled nmers; set up shorelin tainment boom areas uum-trucks and nmers. ential ice conditions m atively impact chanical recovery rations	with	contamination. SCAT; wetland some substrate due to penetrati sandy beaches; structures; oilec removal.	Perform I flushing; removal ion on oiled dock	signifi high b area ar Potent oil in l areas; may b disturt during cause of for ent water of water f	Other Challenges lammability during a sakken spill is a ignificant danger, as are igh benzene vapors in rea around the spill. otential for submerged il in high-sediment reas; wetland access nay be challenge; isturbance of wetlands uring response may ause effects; potential or entrainment of 10% in vater column leading to vater intake and fish kill oncerns; perform water olumn tracking, and air	

Albany 155,000-bbl Bakken Crude Spill (Winter-Low Tide) Response

Occurring Description Probability Port of Albany accident (dock) 155.000 bbl solution Bakken crude Summer High Spill Probability Image: Annual Probability	Scenario	Location	Sou		Volume		Dil Type	Seas	on	Tide		
Spill Probability Spill of Type in Hudson Spill Volume in Hudson US Hudson 0.732 0.0000015 0 0 Conditions Lat/Lon Release Rate Matching Release Datching Release Datc		Port of Albany			155,000 bbl	Bak	kken crude	Summe	er	High		
Probability Spill of Type in Hudson Spill Volume in Hudson US Hudson 0.732 0.000015 0 0 0 Conditions Lat/Lon Release Rate Belease Date/Time Run Duration South / light Temperature 42.61673 38,750 bbh/hr 2.4 agast 30 days South / light 77°F Probability Pool Fire Pool Fire Vapor Cloud Explosion Vapor Cloud Explosion Probability 0.08 0.00000012 0.027 0.0000004 Specific incident decision needs Fremergency Response Fremergency Response Fremergency Response Fremergency Response Infalation or contact with material may initiate or burn skin and cyse. Infalation or contact with material may initiate or burn skin and cyse. Fremasy notice irritating, corrosive and/or toxic gases. Infalation or contact with material may initiate free rallow it to burn out, and texes fill or leak area for at least 300 meters (1/2 fer) in all directions; also, consider initial downwind evacuation for at least 300 meters (1/2 mile) in all directions; also, consider initial evacuation for at least 300 meters (1/2 mile) in all directions; also, consider initial evacuation for stal east 300 meters (1/2 mile) in all directions; also, consider initial evacuation for at least 300 meters (1/2 mile) in all directions; also, consider	Spill		A	nnual P	robability			Historie				
Conditions Lat/Lon Release Rate A2.61673 Release Rate Over 4 hrs Release BackTime Over 4 hrs Run Duration Winds Temperature Fire/Explosion Probabilities Pool Fire Probability/Incident Pool Fire Probability/Incident Pool Fire Probability/Incident Pool Fire Probability/Incident Vapor Cloud Explosion/Incident Vapor Cloud Probability/Incident Vapor Cloud Probability Vapor Cloud Explosion/Incident Vapor Cloud Probability Vapor Cloud Explosion/Incident Vapor Cloud Probability Fire/Explosion Response* Pool Fire Probability Evacuation Zone Health/Safety Issues Inhalation or contact with material may irritate or burn skin and eyes. Specific incident decision needs to be made early as to whether to attack free or allow it to burn out to be made early as to whether to potential size of this fire event. Specific incident decision needs to be made early as to whether to potential size of this fire event. Specific incident decision needs to be made early as to whether to potential size of this fire event. Indicections. Vapors may cause dizziness or suffocation. Fire/Explosion Response* For to falbany has small frefighting vessel, Marine I with in this optimum the potential size of this fire event. IsoLATE for 800 meters (1/2 mile) in all directions; also, onters (1/2 mile) in all directions in sufficient for this larger vessel spilliffire. Vapors may cause dizziness or suffocac		Spill of Type	e in Huds	on	Spill Volum	e in H	Hudson	US	5	Hudson		
Lat/Lon Releave Kale Date/Time Kun Duration Winds Temperature 42.61673 38,750.20 38,750.20 30 days South / light (<10 tx)s	·	0.7	32		0.000	00015		0		0		
42.010/.3 35.700 D0/rr 2 August 2015 1:30pm 30 days Soluh / light ((10 kts) 77°F Fire/Explosion Probabilities Pool Fire Pool Fire Vapor Cloud Vapor Cloud Explosion/Incident Probability Image: Specific incident Probability Do0000012 0.027 0.00000014 Image: Specific incident decision needs is multaneously. Sa an immediate precautionary and a spil on the water Sa an immediate precautionary and a spil on the water Fire may produce irritating, corrosive and/or toxic gases. Specific incident decision needs to be made early as to whether to attack fire or allow it to burn out. Large Spil Vapor Smay cause dizziness or suffocation. Fire/Explosion Response* Abinary and Newburgh trafficer w/monitors for rail crude of this large result Specific incident for the potential size of this fire event. Sind / fire Kingston, Albany and Newburgh trafficer w/monitors for rail crude oil derailment fires but equipment and for toxic inhalation hazard material. Due to the characteristics of crude oil, in an insufficient for this larger ressel spil/fire. Specific incident decision resources in order to provide manpower, foam and equipment to responde to a potential large fire event. Specific incident decision event in lighter flammable gases scan readily ignite if released, when they come in contact with an ignition source. These erude oils may also contain hydrogen suffice, a toxic inhalation hazard material. Due to the characteristics of crude oil, in an accident scenario, the behavior of this product may range from that of gasoline fo	Conditions	Lat/Lon			Date/Time	Run	n Duration	Win	ds	Temperature		
Probability/Incident Probability Explosion/Incident Probability 0.08 0.0000012 0.027 0.0000004 Image: Comparison of the state of the	conditions					3	-	(<10 k	ts)			
Probabilities Insumply intervent Probabilities FirefExplosion This event may have both fire and a spill on the water As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions. Inhalation or contact with material may invite to burn skin and eyes. Fire may produce irritating, corrosive and/or toxic gases. Specific incident decision needs to be made early as to whether to attack fire or allow it to burn out to burn out in the water monitor. This unit may be insufficient for the potential size of this fire event. Large Spill Vapors may cause dizziness or sufficient of solution for at least 300 meters (1/2 mile) in all directions; also as butane and propane (unless these mile) in all directions; also as butane and propane (unless these filting wise). Influence in contact with an ignition source. These crude oils may also contain hydrogen sulfide, or they come in contact with an ignition source. These crude oils may also contain hydrogen sulfide, at toxic inhalation hazard material. Due to the characteristics of crude oils to itsel fine of the reported to implement and mobilize VRP Firefighting contractor resources in order to provide manpower, foam and equipment to respond to a potential large fire event. Inhuber induction contact with an ignition source. These crude oils to ditesel fuel for the healvi	Fire/Explosion											
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Safety Impacts 581 feet 0.3 acre 0.1 acre 0.1 acre 0 acres 0.1 acre Downwind Distance Total Residential Commercial Industrial Public Use		Flammable			In	npact	s from Fire	(Acres)				
Safety Impacts Impacts from Explosion (Acres) Downwind Distance Total Residential Commercial Industrial Public Use		Distance	То	tal	Residential		Commercial	Indus	strial	Public Use		
Downwind Distance Impacts from Explosion (Acres) Total Residential Commercial Industrial Public Use	Sofoty Incoments	581 feet	0.3	acre	0.1 acre		0.1 acre	0 ac	eres	0.1 acre		
Distance Total Residential Commercial Industrial Public Use	Salety Impacts	Downwind			Impa	acts fr	rom Explosio	on (Acres)				
1.66 miles476 acres305 acres47 acres124 acres0 acres			То	tal	Residential	(Commercial	Indu	strial	Public Use		
		1.66 miles	476 :	acres	305 acres		47 acres	124 a	acres	0 acres		

Albany 155,000-bbl Bakken Crude Spill with Fire/Explosion

⁸ If concurrent with a spill to the water, see also spill response tables. If there is a fire and/or explosion, some or even most of the oil may be consumed by the fire, reducing the amount of oil that would spill into the river and affect shorelines. In most cases, it would be necessary to conduct at least some oil spill cleanup in addition to fire-fighting, though those operations would be secondary to emergency fire-fighting operations.

³² Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

Coxsackie 25,000-bbl Home Heating Oil Spill

Coxsackie 25,000-bbl Home Heating Oil Spill (Spring-High Tide) Effects

Scenario Description Spill Probability	Locat Coxsa Spi	ckie		grounding		olume		Oil Type		Season		Tide Stage
Spill					25							
	Spi	Annu		JIIISIOII	23	,000 bbl	H	ome heating oil		Spring		High ual Frequency
	Spi	Annual Probability Anywhere in Hudson River Instantial Frequency (2000-2015) Spill of Type (Any Volume) Spill of Type and Volume US Hudson										
	0.732 0.012 0									US		Hudson
		0.7	732			0.0)12			0		0
Conditions	Lat/I		Relea	ase Rate	Da	Release nte/Time		Model Run Duration		Winds		Water Temperature
Conditions	42.35 -73.78		Inst	antaneous		pril 2016 3:00am		30 days	3	SW / modera (5-20 kts)	ate	46°F
				Mass B	alance	at End of M	Iodel	Run (After	30 D	ays)		
	Fate	Surf	ace	Atmosph	nere	Water Column	L	Sedimen	t	Ashore	•	Degraded
	%	0.0	%	44.5%	b	32.2%		0.8%		4.9%		17.6%
SIMAP Modeling	bbl	1	1	11,11	5	8,046		201		1,232		4,395
Results			Spatia	l Extent of	Expos	sure over Th	resh	old (Up to 30) Day	ys After Spi	ll)	
	Water	· (Volum	-	0		face (Area x	-	-				(Length)
										Socioeconomic (1 g/m ²)		
									175 mi			
			Shore	line Expos	ure by	Shore Type	(Mi	les over Ecol	ogica	al Threshold	l)	
	Bec	lrock	τ	Jnconsolida Rock	ated	Sand I	Beac	h Mu	d or	Timber	A	artificial Shore
	14	4.6 mi		46.7 m	i	1.	5 mi		15	.9 mi		0 mi
Faclosical		Bra	ckish/Es	stuarine W	etland	Habitats Ex	cpose	ed (Miles ove	r Ec	ological Thi	esho	ld)
Ecological Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal F		gmites land		nrub/Scrub and rested Wetland
Exposures	0 m	i		0 mi		0.1	mi		0 1	ni		0 mi
								Ailes over Ec				
	Cattai	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal F		gmites land		rub/Scrub and rested Wetland
	0.2	2 mi		6 mi		2.7	mi		0.5	mi		0.1 mi
						-		Spill and Res	-	-		
 Socioeconomic Impacts Response operations may cause major impacts to ports in Albany and throughout river for at least severa 175 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront n beaches, parks, and real estate would be affected by oil, including residue and odor. SCAT operations an would be focused on areas more heavily oiled (about 88 miles). Riverside parks, marinas, beaches, indus commercial property, and shorefront real estate would be most affected on the west shore from Coxsacki Lloyd, and on the east shore from Stuyvesant to Hyde Park. Additional impacts may be experienced in o towns along the river. Water intakes that may be affected include: Ulster Mile 96; Rondout Mile 92; Rhim Mile 92; Port Ewen Mile 89; Hyde Park Mile 80; Poughkeepsie Mile 77; Highland Mile 76; IBM Mile 7 Additional precautionary fishing advisories would likely be instituted for much or all of the river. 									efront marinas, tions and cleanup s, industry, oxsackie to ced in other 92; Rhinebeck Mile 72.			

	,			• .	nt and Plan Activati		,	
	NCP and			Response Require	GRPs/ GRSs Activated (7 days)			
	USCG Type	Tier 1 (24	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major MMPD- WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/c 3,750 bbl s	300 per system lay storage	skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage ted Outcomes and (n		48 river miles Mile 123-75 2016-22 to 2016-58
	Protective B		-	chanical Recovery	Shoreline Clea		1	er Challenges
Spill Response	An average cur velocity of 1.1 in high currents reduce boom effectiveness, containment an diversionary bc configurations angled to preve entrainment and over; exclusion deflection confi to be used to pr sensitive areas.	d oom to be nt d splash and igurations rotect	45% e rapid s reduce recove mobili propel up sho boom	evaporation and spreading will e amount that can be ered mechanically; ize floating self- lled skimmers; set oreline containment areas with vacuum- and skimmers.	About 5% is antic to cause shoreline contamination. Pe SCAT; wetland fl some substrate ren due to penetration sandy beaches; oii structures; oiled d removal.	erform ushing; moval on led dock	Potentia oil in hi areas; w may be disturba during r cause ef for entra water co water in concern	I for submerged gh-sediment etland access challenge; nce of wetlands esponse may fects; potential ainment of 32% in blumn leading to take and fish kill s; perform water tracking.

Coxsackie 25,000-bbl Home Heating Oil Spill (Spring-High Tide) Response

Scenario	-	ation		urce		Volume	· •	Oil Typ			Season		Tide Stage				
Description	Coxs	ackie		rounding llision	25	5,000 bbl	Но	me heati	ng oil		Spring		Low				
Spill		Anı	nual Prob	ability A	nywhei	re in Hudson	Rive	r		H	Historical Annual Frequency (2000-2015) US Hudson						
Probability	Sp	ill of Typ	e (Any V	olume)	S	pill of Type a	nd Vo	olume			US		Hudson				
		0.732				0.0	012				0		0				
Conditions	Lat/		Releas	se Rate	D	Release ate/Time		Model R Duratio			Winds		Water Temperature				
		5119 78982	Instan	taneous		April 2016 1:00am		30 day	S		V / modera (5-20 kts)	ate	46°F				
				Mass B	Balance	e at End of M	odel	Run (Af	ter 30 I	Days)	1						
	Fate	Sur	face	Atmosp	here	Water Colu	mn	Sec	liment		Ashor	e	Degraded				
	%	0.1	1%	46.	3%	28.1%		C	0.8%		6.3%		18.5%				
SIMAP	bbl	21		11,	563	7,025		1	91		1,564		4,636				
Modeling Results			Spatia	l Extent of	f Expo	sure over Th	resho	ld (Up t	o 30 Da	ys A	fter Spill))					
Kesutis	Wate	er (Volum	e) – Ecol	ogical	Su	urface (Area y	x Day	s Expos	ed)		Shore	line	(Length)				
		ole Oil ng/l)		solved 1 mg/l)	(cological 10 g/m²)		ocioecon (0.01 g/	-		Ecological (100 g/m ²		Socioeconomic (1 g/m ²)				
	136,030) mil gal	197,43	5 mil gal	13	mi ² -days	1	7 mi^2 -da	ays		202 mi						
	Shoreline Exposure by Shore Type (Miles over Ecological Threshold)																
	В	edrock	U	nconsolid Rock	ated	Sand I	Beach	l I	Mud	or T	imber	A	rtificial Shore				
	1	17.5 mi		57.3 n	ni	1.4	mi			18.5	mi		0 mi				
Ecological		Bra				Habitats Ex	posed	l (Miles		-							
Shoreline Exposures	Sal	ltmarsh	Ul	oper Inter Mix	tidal	Lower Inte	rtida	l Mix		ragm Vetla			rub/Scrub and rested Wetland				
Liposuros		0.1 mi		0.2 m	i	0.1	mi			0.6 n	ni		0 mi				
						bitats Expose	ed (M	iles over		-							
	Catta	ail Marsh	U	oper Inter Mix	tidal	Lower Inte	rtida	l Mix		ragm /etla			rub/Scrub and rested Wetland				
		0.6 mi		8.1 m	i	2.2	mi			0.5 1	mi		0.1 mi				
	Potential Socioeconomic Impacts from Spill and Response Operations																
Socioeconomic Impacts	Response operations may cause major impacts to ports in Albany and throughout river for at least several days 202 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marinate beaches, parks, and real estate would be affected by oil, including residue and odor. SCAT operations and clear									ront marinas, ons and cleanup s, industry, xsackie to d in other towns bebeck Mile 92;							

Coxsackie 25,000-bbl Home Heating Oil Spill (Spring-Low Tide) Effects

				Response Equipme	ent	and Plan Activa	tion		-
	NCP and		Tier	Response Require	mei	nts	GRP		Ss Activated ays)
	USCG Type	Tier 1 (24	hrs)	Tier 2 (48 hrs)	,	Tier 3 (72 hrs)	Rail Mi	les	River Miles
	Major MMPD- WCD	25,000 ft bo 1,000 ft + 30 skimming sy 1,875 bbl/da 3,750 bbl sto	00 per 1,000 ft + 300 per skimming system 3,750 bbl/day		25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage		n/a		45 river miles Mile 123-78 2016-22 to 2016-56
		F	Respon	se Overview: Expe	cte	d Outcomes and	Challenges		
	Protective	Booming	Me	echanical Recovery		Shoreline C	Cleanup	Ot	her Challenges
Spill Response	An average curvelocity of 1.1 in high current reduce boom effectiveness, of and diversiona configurations angled to preve entrainment an over; exclusion deflection confi to be used to p sensitive areas.	rrent kts results s that will containment ry boom to be ent d splash 1 and figurations rotect	46% rapid reduc recov mobi prope up sh	evaporation and spreading will ce amount that can b vered mechanically; lize floating self- elled skimmers; set noreline containment n areas with vacuum is and skimmers.		About 6% is ant cause shoreline contamination. I SCAT; wetland some substrate r to penetration of beaches; oiled d structures; oiled removal.	Perform flushing; emoval due n sandy ock	Poten oil in areas; may b distur durin, cause for en in wa to wa kill co	tial for submerged high-sediment wetland access be challenge; bance of wetlands g response may effects; potential atrainment of 28% ter column leading ter intake and fish poncerns; perform column tracking.

Coxsackie 25,000-bbl Home Heating Oil Spill (Spring-Low Tide) Response

	Loca			ource		olume	-	Oil Type	Season	,	Tide Stage
Scenario Description	Coxsa	ackie		grounding ollision	25	,000 bbl	Н	ome heating oil	Summer		High
Spill		Annı	ial Prob	ability Any	where	e in Hudson	Rive	r			ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	S	pill of Type	and `	Volume	US		Hudson
		0.7	732			0.0)12		0		0
Conditions	Lat/I		Relea	ase Rate	Da	Release nte/Time	Model Run Duration		Winds		Water Temperature
Conditions	42.35 -73.78		Instant	aneous	7 August 2016 2:00am			30 days	Light / varia (<5 kts)	ble	77°F
				Mass B			Aodel Run (After 3		80 Days)		
	Fate	Surf	ace	Atmospl	here	Water Column	I	Sediment	Ashor	e	Degraded
	%	0.0	%	70.3%	7.4%		0.3%	18.6%)	3.4%	
SIMAP Modeling	bbl	0	0 17,574 1,858 70						4,638		860
Results			Spatia	al Extent of	Expo	sure over Th	resh	old (Up to 30	Days After Sp	ill)	
		r (Volum					x Days Exposed)				(Length)
	Whol (1 n	le Oil 1g/l)		ssolved 01 mg/l)		cological 10 g/m ²)	Socioeconom (0.01 g/m ²)		Ecologica (100 g/m		Socioeconomic (1 g/m ²)
	32,178	mil gal	41,82	0 mil gal	41 mi ² -days 48 mi ² -days				70 mi		100 mi
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)									
	Be	Bedrock Unconsolida Rock		ated	Sand 1	Beac	h Mu	d or Timber	A	Artificial Shore	
	1.	6 mi		16.6 mi					42.8 mi		0 mi
Ecological		Bra					_		· Ecological Th		
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M			hragmites Wetland	Shrub/Scrub and Forested Wetland	
Linposures	() mi		0 mi		0.1	mi		0 mi		0 mi
									ological Thresh		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M			hragmites Wetland		hrub/Scrub and prested Wetland
	1	l mi		3.2 mi		3.1	mi		1.4 mi		0.1 mi
									ponse Operatio		
Socioeconomic Impacts	Response operations may cause major impacts to ports in Albany and throughout river for at least several days. 100 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and real estate would be affected by oil, including residue and odor. SCAT operations and cleanup would be focused on areas more heavily oiled (about 70 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Coxsackie to Bethlehem, and on the east shore from Stuyvesant to Schodack. Additional impacts may be experienced in other towns along the river. Water intakes that may be affected include: PSE&G Mile 141; Bethlehem Mile 137; Castleton Mile 136. Additional precautionary fishing advisories would likely be instituted for much or all of the river.										

Coxsackie 25,000-bbl Home Heating Oil Spill (Summer-High Tide) Effects

			R	esponse Equipment	t and Plan Activatio	n	-	-	
	NCP and		Tier	Response Requirer	nents	G		Ss Activated lays)	
	USCG Type	Tier 1 (2	24 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rai	Miles	River Miles	
	Major MMPD-WCD	25,000 ft boom 1,000 ft + 300 per skimming system 1,875 bbl/day 3,750 bbl storage		25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n/a		15 river miles Mile 123-138 2016-22 to 2016-12	
		l	Response	Overview: Expecte	ed Outcomes and Cl	hallenge	s		
	Protective Bo	oming	Mech	anical Recovery	Shoreline Clear	nup	Oth	er Challenges	
Spill Response	An average currer velocity of 1.1 k in high currents reduce boom effectiveness, containment and diversionary boo configurations to angled to preven entrainment and over; exclusion a deflection config to be used to pro sensitive areas.	ts results that will om b be t splash and gurations	rapid sp reduce a recovered mobilize propelle up shore boom a	aporation and reading will amount that can be ed mechanically; e floating self- ed skimmers; set eline containment reas with vacuum- nd skimmers.	About 19% is antic to cause shoreline contamination. Perf SCAT; wetland flux some substrate rem due to penetration of sandy beaches; oile structures; oiled del removal.	form shing; oval on ed dock	oil in hig areas; w be challe of wetlar response effects; j entrainm water co water in concerns areas nea prior to o	l for submerged gh-sediment etland access may enge; disturbance nds during e may cause potential for hent of 7% in dumn leading to take and fish kill s especially in ar the spill site dilution; perform dumn tracking.	

Coxsackie 25,000-bbl Home Heating Oil Spill (Summer-High Tide) Response

	Loca			ource		olume	-	Oil Type	Season		Tide Stage
Scenario Description	Coxsa			grounding ollision		,000 bbl		ome heating oil	Summer		Low
Spill		Ann			where	in Hudson	Rive	r			ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any V	Volume)	S	pill of Type	and `	Volume	US		Hudson
-		0.7	732			0.0)12		0		0
Conditions	Lat/I		Relea	ase Rate	Da	Release ite/Time	Model Run Duration		Winds		Water Temperature
Conditions	42.35 -73.78		Insta	ntaneous	2010 0:30am		30 days	Light / variab (<5 kts)	le	77°F	
				Mass B			Aodel Run (After 3		0 Days)		
	Fate	Sur	face	Atmospl	here	Water Column	<u>1</u>	Sediment	Ashore	e	Degraded
	%	0.0	1%	70.1%	6	6.8%		0.3%	19.4%		3.4%
SIMAP Modeling	bbl								4,846		856
Results	Spatial Extent of Exposure over Threshold (Up to 30						old (Up to 30	Days After Spi	ill)		
		r (Volum	-	0			x Days Exposed)				(Length)
	Whol (1 n			ssolved 01 mg/l)		cological 10 g/m ²)	Socioeconomi (0.01 g/m ²)		Ecologica (100 g/m ²		Socioeconomic (1 g/m ²)
	27,011	mil gal	37,38	88 mil gal	38 mi ² -days 45 mi ² -days				69 mi		95 mi
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)									
	Bedrock		τ	Unconsolida Rock	ated	Sand	Beac	h Mud	or Timber	A	Artificial Shore
	1.	6 mi		17.5 mi		0 mi			42.2 mi		0 mi
Ecological		Bra					_	ed (Miles over			
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M	ntert lix		ragmites Vetland		hrub/Scrub and prested Wetland
Enposures	C) mi		0.3 mi		0.1	mi		0 mi		0 mi
								Ailes over Eco	-		
	Cattai	il Marsh	U	pper Inter Mix	tidal	Lower In M	ntert lix		ragmites Vetland		hrub/Scrub and prested Wetland
	().9 mi		2.4 mi		2.3	mi		1.3 mi		0.1 mi
								Spill and Resp			
Socioeconomic Impacts	Response operations may cause major impacts to ports in Albany and throughout river for at least several days. 95 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and real estate would be affected by oil, including residue and odor. SCAT operations and cleanup would be focused on areas more heavily oiled (about 69 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Coxsackie to Bethlehem, and on the east shore from Stuyvesant to Rensselaer. Additional impacts may be experienced in other towns along the river. Water intakes that may be affected include: OGS Mile 145; Rensselaer Mile 144; PSE&G Mile 141; Bethlehem Mile 137; Castleton Mile 136. Additional precautionary fishing advisories would likely be instituted for much or all of the river.										

Coxsackie 25,000-bbl Home Heating Oil Spill (Summer-Low Tide) Effects

			R	esponse Equipment	t and Plan Activatio	n		· ·
	NCP and		Tier	Response Require	ments	G		Ss Activated ays)
	USCG Type	Tier 1 (2	24 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rai	Miles	River Miles
	Major MMPD-WCD		boom 300 per system /day storage	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	,000 ft + 300 per kimming system ',500 bbl/day		22 river miles Mile 123-145 2016-22 to 2016-6
]	Response	Overview: Expect	ed Outcomes and Cl	hallenge	s	
	Protective Bo	oming	Mech	anical Recovery	Shoreline Clear	nup	Othe	er Challenges
Spill Response	An average currer velocity of 1.1 k in high currents reduce boom effectiveness, containment and diversionary boo configurations to angled to preven entrainment and over; exclusion a deflection config to be used to pro sensitive areas.	ts results that will om b be t splash and gurations	rapid sp reduce a recover mobiliz propelle up shor boom a	aporation and preading will amount that can be ed mechanically; the floating self- ed skimmers; set eline containment reas with vacuum- and skimmers.	About 19% is antic to cause shoreline contamination. Per SCAT; wetland flu some substrate rem due to penetration of sandy beaches; oile structures; oiled de removal.	form shing; oval on ed dock	oil in hig areas; we be challe of wetlar response effects; p entrainm water co water int concerns spill site	for submerged th-sediment etland access may enge; disturbance ads during may cause botential for eent of 7% in lumn leading to ake and fish kill e especially near prior to dilution; water column

Coxsackie 25,000-bbl Home Heating Oil Spill (Summer-Low Tide) Response

	Loca			ource		olume	<u>`</u>	Oil Type		Season		
Scenario Description	Coxsa		Tanker	grounding		,000 bbl		ome heati		Winter		Tide Stage High
		Annu		ollision ability Any	where	in Hudson	Rive	oil r				ual Frequency
Spill	Sni	ill of Typ								US (2000		2015) Hudson
Probability	Зр	• •	732	volume)	5	0.012				0		0
	T (1)			D (Release		Model Ru		n	-		Water
Conditions	Lat/		Kelea	ase Rate	Date/Time			Duration		Winds	1	Temperature
	42.3 -73.7	35119 8982	Insta	ntaneous	1 January 2016 3:00am 30 days				Light / variab (<5 kts)	ole	32°F	
				Mass B	alance	at End of M	lodel	Run (Af	After 30 Days)			
	Fate	Surf	ace	Atmosph	here	Water Column	L	Sedin	nent	Ashore	e	Degraded
	%	0.0	%	66.3%	6	0.9%		0.3	%	30.2%		2.4%
SIMAP Modeling	bbl	C		16,564	64 217 69)	7,550		599	
Results			Spatia	al Extent of	f Expos	sure over Th	nresh	old (Up t	o 30 Da	ays After Spi	ll)	
			volume) – Ecological				x Days Exposed)					(Length)
							cioecono (0.01 g/m		Ecological (100 g/m ²		Socioeconomic (1 g/m ²)	
			$\begin{array}{c} 65 \text{ mil gal} \\ 65 \text{ mil gal} \\ \end{array} \begin{array}{c} (10 \text{ gm})^2 \\ 57 \text{ mi}^2 \\ \text{days} \end{array}$				6 mi ² -day		99 mi	,	117 mi	
		-	Shore	eline Expos	ure by	Shore Type	e (Mi	les over E	Ecologi	cal Threshol	d)	
			Unconsolida Rock	ated	Sand	Beacl	h	Mud o	r Timber	A	Artificial Shore	
	12	12.5 mi		38.5 mi		1.1 mi			27.8 mi		0 mi	
Ecological		Bra					_			cological Th		
Shoreline	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		nrub/Scrub and prested Wetland
Exposures	() mi		0 mi		0.1	mi		0) mi		0 mi
			Freshw	ater Wetla	nd Hal				r Ecolo	gical Thresh		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		nrub/Scrub and prested Wetland
	1.	.4 mi		12.9 mi		4.1				3 mi	10	0.1 mi
			Poten	tial Socioed	conomi	ic Impacts f	rom S	Spill and	Respor	ise Operatio	ns	
Socioeconomic Impacts	Potential Socioeconomic Impacts from Spill and Response Operations Response operations may cause major impacts to ports in Albany and throughout river for at least several days. 117 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and real estate would be affected by oil, including residue and odor. SCAT operations and cleanu would be focused on areas more heavily oiled (about 99 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Coxsackie to Kingston, and on the east shore from Stuyvesant to Rhinebeck. Additional impacts may be experienced in other towns along the river. Water intakes that may be affected include: Ulster Mile 96; Rondout Mile 92; Rhinebeck Mile 92. Additional precautionary fishing advisories would likely be instituted for much or all of the river.									efront marinas, tions and cleanup s, industry, coxsackie to ienced in other 92; Rhinebeck		

Coxsackie 25,000-bbl Home Heating Oil Spill (Winter-High Tide) Effects

O O A O A O A O A O													
			R	esponse Equipment	and Plan Activatio	n							
	NCP and		Tier	Response Requirer	nents	GRPs/ GRSs Activated (7 days)							
	USCG Type	Tier 1 (24 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles					
	Major MMPD-WCD	25,000 ft 1,000 ft + skimming 1,875 bbl 3,750 bbl	- 300 per g system /day	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	1	n/a	30 river miles Mile 123-93 2016-22 to 2016-45					
		nallenge	s										
	Protective Bo	oming	Mech	anical Recovery	Shoreline Clear	nup	Othe	er Challenges					
	An average curre			aporation and reading will	About 30% is anticated to cause shoreline	ipated	Potential for submerged oil in high-sediment						
Spill Response	velocity of 1.1 kts results in high currents that will			amount that can be	contamination. Perf	form	areas; wetland access may						
	reduce boom			ed mechanically;	SCAT; wetland flus		be challenge; disturbance						
	effectiveness, containment and			e floating self- ed skimmers; set	some substrate reme due to penetration of		of wetlands during response may cause						
	diversionary boo			eline containment	sandy beaches; oile			potential for					
	configurations to	be	boom ar	reas with vacuum-	structures; oiled del		entrainm	ent of 1% in					
	angled to prevent entrainment and		trucks a	nd skimmers.	removal.			lumn leading to negative water					
	over; exclusion a		Potentia	al ice conditions				d fish concerns					
	deflection config			ect mechanical				y in areas near					
	to be used to protect sensitive areas.		recover	y operations.				site prior to perform water					
	Potential ice con	ditions					column t						
	may affect boom deployment.							č					

Coxsackie 25,000-bbl Home Heating Oil Spill (Winter-High Tide) Response

	Loca			ource		olume	```	Oil Type		Season	Tide Stage	
Scenario Description	Coxsa		Tanker	grounding ollision		,000 bbl		ome heating oil		Winter		Low
Spill		Annu			where	in Hudson	River	•				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	S	pill of Type	and V	olume		US		Hudson
		0.7	732		0.012				0			0
Conditions	Lat/	Lon	Relea	ase Rate	Release Date/Time			Model Run Duration		Winds		Water Temperature
Conditions	42.35 -73.75		Insta	ntaneous	9:00am		30 days]	Light / variat (<5 kts)	ole	32°F	
				Mass B	alance at End of Model H		Run (After	: 30 I	Days)			
	Fate	Surf	face	Atmospl	nere	Water Column	l	Sedime	nt	Ashore	e	Degraded
	%	0.0)%	66.2%	6	0.6%	0.3%			30.6%		2.3%
SIMAP Modeling	bbl	2	2	16,54	4	147 64				7,661		582
Results			Spatia	al Extent of	Expo	sure over Tł	nresho	old (Up to 3	80 Da	ys After Spi	ll)	
		r (Volum				face (Area x						(Length)
	Whol (1 n	le Oil		Dissolved (0.001 mg/l)		Ecological (10 g/m ²)		Socioeconom (0.01 g/m ²)		Ecological (100 g/m ²)		Socioeconomic (1 g/m ²)
				6 mil gal 47 mi ² -day				4 mi ² -days		92 mi	,	106 mi
	,	Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
			Jnconsolida Rock	ated	Sand	Beach	n M	ud o	r Timber	A	Artificial Shore	
	8.	1 mi		34.5 mi		0.6	0.6 mi		30.9 mi		0 mi	
Faclasian		Bra	ckish/E	stuarine W	etland	Habitats Ex	xpose	d (Miles ov	er Eo	ological Th	resho	old)
Ecological Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		dal		gmites tland	Shrub/Scrub and Forested Wetland	
Exposures	C) mi		0 mi		0.1	mi		0	mi		0 mi
										gical Thresh		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		dal		gmites tland		nrub/Scrub and prested Wetland
	1.	.8 mi		10.4 mi		4.2				8 mi	FU	0.3 mi
			Poten		conomi	· · · · · · · · · · · · · · · · · · ·		Spill and Re		se Operatio	ns	
Socioeconomic Impacts	106 mile beaches, would be commerce Ulster, a towns ale	es of shor parks, ar e focused cial prope nd on the ong the r	ons may eline wo nd real es on areas erty, and e east sho iver. Wa	cause majo uld be oiled state would s more heav shorefront to ore from Stu ter intakes t	r impacts to ports in Albany and throughout river for at least severa l above the level of concern for socioeconomic effects; shorefront n be affected by oil, including residue and odor. SCAT operations an rily oiled (about 92 miles). Riverside parks, marinas, beaches, indus real estate would be most affected on the west shore from Coxsacki uyvesant to Red Hook. Additional impacts may be experienced in of hat may be affected include: Ulster Mile 96; Rondout Mile 92; Rhin hing advisories would likely be instituted for much or all of the rive					efront marinas, tions and cleanup s, industry, coxsackie to ced in other 92; Rhinebeck		

Coxsackie 25,000-bbl Home Heating Oil Spill (Winter-Low Tide) Effects

NCP and USCG TypeTier 1 (24 hrs)Tier 2 (48 hrs)Tier 3 (72 hrs)Rail MileMajor MMPD-WCD25,000 ft boom 1,000 ft + 300 per skimming system 1,875 bbl/day 3,750 bbl storage25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 15,000 bbl storageResponse Verview: Expected Outcomes and Challenges	/ GRSs Activated (7 days) es River Miles 28 river miles Mile 123-95 2016-22 to 2016-44
NCP and USCG TypeTier 1 (24 hrs)Tier 2 (48 hrs)Tier 3 (72 hrs)Rail MileMajor MMPD-WCD25,000 ft boom 1,000 ft + 300 per skimming system 1,875 bbl/day 3,750 bbl storage25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 15,000 bbl storageResponse Verview: Expected Outcomes and Challenges	(7 days)esRiver Miles28 river milesMile 123-952016-22 to
Major MMPD-WCD 25,000 ft boom 1,000 ft + 300 per skimming system 1,875 bbl/day 3,750 bbl storage 25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day n/a Response Overview: Expected Outcomes and Challenges	28 river miles Mile 123-95 2016-22 to
Major MMPD-WCD1,000 ft + 300 per skimming system 1,875 bbl/day 3,750 bbl storage1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storagen/aResponse Overview: Expected Outcomes and Challenges	Mile 123-95 2016-22 to
Response Overview: Expected Outcomes and Challenges	
Protective Booming Mechanical Recovery Shoreline Cleanup	
	Other Challenges
Spill Responsevelocity of 1.1 kts results in high currents that will reduce boom effectiveness, containment and diversionary boom entrainment and splash over; exclusion and deflection configurations to be used to protect sensitive areas.rapid spreading will republic spreading will reduce amount that can be 	tential for submerged in high-sediment as; wetland access may challenge; disturbance wetlands during ponse may cause ects; potential for rainment of 1% in ter column leading to tential negative water ake and fish concerns becially in areas near e spill site prior to ution; perform water umn tracking.

Coxsackie 25,000-bbl Home Heating Oil Spill (Winter-Low Tide) Response

Proposed Kingston Anchorage 150,000-bbl Home Heating Oil Spill

Kingston 150,000-bbl Home Heating Oil Spill (Spring-High Tide) Effects

-	,	bo,000-bbi fiome freating on Spin (Spring-frigh fide) Enects											
	Loca		So	ource	V	olume		Oil Ty	pe	Season		Tide Stage	
Scenario Description	Propo King Ancho	ston	ATB	collision	150	0,000 bbl	Н	ome he oil	eating	Spring		High	
Spill		Annı	ial Prob	ability Any	where	e in Hudson	Rive	r		Historical Annual Frequency (2000-2015)			
Probability	Spi	ill of Typ	e (Any V	Volume)	S]	pill of Type	Type and Volume			US		Hudson	
		0.7	732	32		0.000	00015	5		0		0	
Conditions	Lat/		Relea	ase Rate	Release Date/Time		Model Run Duration			Winds		Water Temperature	
Conditions	41.93 -73.93			0 bbl/hr er 4 hrs	1 April 2016 3:00am 30 days			lys	South / mode (2-15 kts)		48°F		
				Mass B			Iodel Run (After 3		After 30	Days)			
	Fate	Surf	ace	Atmospl	here	Water Column	1	Se	diment	Ashore	è	Degraded	
	%	1.0	%	51.99	6	25.7%	25.7% 0.8%			1.5%		19.1%	
SIMAP	bbl	1,4	30	77,82	7	38,538		1	1,187	2,301		28,717	
Modeling Results		Spatial Extent of Exposure over Threshold (Up to 30					p to 30 D	ays After Spi	ll)				
	Wate	Water (Volume) – Ecological			Sur	face (Area x	. Day	s Expo	osed)	Shore	eline (Length)		
		le Oil	Dissolved		Ecological		Socioeconomic			Ecological		Socioeconomic	
	(1 n	U /				0 g/m²) (0.01 mi ² -days 65 mi		(0.01 g		(100 g/m^2))	(1 g/m^2)	
	592,012	mil gai				-			-	110 mi	•	208 mi	
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold) Bedrock Unconsolidated Sand Beach Mud or Timber Artificial Shore											
	Be	drock		Rock		Sand 1	Beac	h	Mud	or Timber	A	rtificial Shore	
	19	9.6 mi		74.6 mi	0.1 mi			7	.7 mi		0 mi		
E a la sta l		Brackish/Estuarine Wetland Habitats Exposed (Miles over Ecological Threshold)											
Ecological Shoreline Exposures	Salt	tmarsh	U	Upper Intertidal Mix		Lower Intertidal Mix		idal	Phragmites Wetland		Shrub/Scrub Forested Wetl		
Exposures	0.	.6 mi		0.1 mi		0 1	mi		1	.4 mi		0 mi	
										gical Thresh	old)		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		rub/Scrub and rested Wetland	
	0.	.1 mi		5 mi		1.2	mi			0 mi		0.2 mi	
			Poten	tial Socioed	conomi	ic Impacts f	rom S	Spill ar	nd Respo	nse Operatio	ns		
Socioeconomic Impacts	Response operations may cause major impacts to ports in Albany and throughout river for at least several day. 208 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marina beaches, parks, and real estate would be affected by oil, including residue and odor. SCAT operations and clear would be focused on areas more heavily oiled (about 110 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Kingston to Highlands, and on the east shore from Rhinebeck to Philipstown. Additional impacts may be experienced in o towns along the river. Water intakes that may be affected include: Rondout Mile 92; Rhinebeck Mile 92; Port Ewen Mile 89; Hyde Park Mile 80; Poughkeepsie Mile 77; Highland Mile 76; IBM Mile 72; Danskammer Mile 66; Chelsea Mile 66; Roseton Mile 65. Additional precautionary fishing advisories would likely be instituted at the state of the								efront marinas, tions and cleanup es, industry, ingston to erienced in other Mile 92; Port skammer Mile				

	,			• .	nt and Plan Activati		,	•		
	NCP and			Response Require		nts GRPs/ GRSs Activated (7 days)				
	USCG Type	Tier 1 (24	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles		
	Major WCD	25,000 ft boom 1,000 ft + 300 per skimming system 1,875 bbl/day 3,750 bbl storage		25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n/a		35 river miles Mile 90-55 2016-47 to 2016-73		
]	Respons	se Overview: Expec	ted Outcomes and O	Challenge	s			
	Protective B	ooming	Mec	chanical Recovery	Shoreline Clea	anup	Oth	er Challenges		
Spill Response	An average cur velocity of 1.1 in high currents reduce boom effectiveness, containment an diversionary bc configurations angled to preve entrainment and over; exclusion deflection confi to be used to pr sensitive areas.	kts results s that will d oom to be ont d splash and igurations rotect	rapid s reduce recove mobili propel up sho boom	evaporation and spreading will e amount that can be ered mechanically; ize floating self- lled skimmers; set oreline containment areas with vacuum- and skimmers.	About 2% is antic to cause shoreline contamination Per SCAT; wetland fl some substrate ren due to penetration sandy beaches; oil structures; oiled d removal.	form ushing; noval on led dock	oil in hi areas; w be chall of wetla response effects; entrainn water co water in concern	l for submerged gh-sediment etland access may enge; disturbance nds during e may cause potential for nent of 26% in olumn leading to take and fish kill s; perform water tracking.		

Kingston 150,000-bbl Home Heating Oil Spill (Spring-High Tide) Response

3	-					<u> </u>	(-					
~ .	Loca		So	ource	I	olume		Oil Ty	pe	Season		Tide Stage
Scenario Description	Prop King Ancho	ston	ATB	collision	15	0,000 bbl	Н	lome hea oil	ating	Spring		Low
Spill		Annı	ial Prob	ability Any	where	e in Hudson	Rive	er		Historical Annual Frequency (2000-2015)		
Probability	Spi	ill of Typ	e (Any V	Volume)	S	pill of Type	and	Volume	•	US		Hudson
		0.7	32			0.0000015			0			0
Conditions	Lat/		Relea	ase Rate	Release Date/Time			Model Run Duration		Winds		Water Temperature
Conditions	41.93 -73.9			00 bbl/hr er 4 hrs	1 April 2016 3:00am 30 days			ys	South / mode (2-15 kts)		48°F	
				Mass B	alance at End of Mo		lode	l Run (A	After 30	Days)		
	Fate	Surf	ace	ace Atmosphere		Water Column	l	Sed	liment	Ashore	e	Degraded
	%	1.0	%	51.9%	.9% 25.7% 0.			0.8%	1.5%		19.1%	
SIMAP	bbl	1,4	30	77,82	7	38,538		1	,187	2,301		28,717
Modeling Results	Spatial Extent of Exposure over Threshold (Up to 30					o to 30 D	ays After Spi	ll)				
	Wate	Water (Volume) – Ecological				Surface (Area x Days Expo			sed)	Shore	eline	(Length)
		le Oil ng/l)		Dissolved (0.001 mg/l)		cological 10 g/m ²)		Socioeconomic (0.01 g/m ²)		Ecological (100 g/m ²		Socioeconomic (1 g/m ²)
	692,275			52 mil gal	75	75 mi ² -days			lays	126 mi		226 mi
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
	Be	Bedrock		Unconsolidat Rock		Sand 1	Beac	h	Mud	or Timber	A	Artificial Shore
	20).7 mi	85.4 mi			0.2 mi			Ç	9.5 mi		0 mi
Faclosical		Bra	ckish/E	stuarine W	etland	Habitats Ex	kpose	ed (Mile	es over I	Ecological Thi	resho	old)
Ecological Shoreline Exposures	Salt	tmarsh	U	pper Inter Mix	tidal				Phragmites Wetland		Shrub/Scrub and Forested Wetland	
Exposures	0.	.7 mi		0 mi		0 1	ni		1	1.6 mi		0 mi
										ogical Thresh	old)	
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites /etland		nrub/Scrub and prested Wetland
	0.	.2 mi		6.6 mi		1.1	mi			0 mi		0.1 mi
						-		-	-	onse Operation		
										out river for at		
												efront marinas, tions and cleanup
Socioeconomic										rks, marinas, b		
Impacts	commer	cial prope	rty, and	shorefront	real est	ate would be	mos	st affecte	ed on the	west shore fro	om K	ingston to
1	commercial property, and shorefront real estate would be most affected on the west shore from Kingston to Cornwall, and on the east shore from Rhinebeck to Philipstown. Additional impacts may be experienced in other											
	towns along the river. Water intakes that may be affected include: Rondout Mile 92; Rhinebeck Mile 92; Port Ewen Mile 89; Hyde Park Mile 80; Poughkeepsie Mile 77; Highland Mile 76; IBM Mile 72; Danskammer Mile											
	66; Chelsea Mile 66; Roseton Mile 65. Additional precautionary fishing advisories would likely be instituted for											
	much or	all of the	river.									

Kingston 150,000-bbl Home Heating Oil Spill (Spring-Low Tide) Effects

			ŀ	Response Equipment	t and Plan Activatio	n					
	NCP and		Tier	Response Requiren	nents	GRPs/ GRSs Activated (7 days)					
	USCG Type	Tier 1 (24 hrs)		Tier 2 (48 hrs)	Tier 3 (72 hrs)	3 (72 hrs) Rail		River Miles			
	Major WCD	25,000 ft boom 1,000 ft + 300 per skimming system 1,875 bbl/day 3,750 bbl storage		25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	J	n/a	32 river miles Mile 90-58 2016-47 to 2016-71			
]	Respons	e Overview: Expecte	ed Outcomes and Cl	nallenge	s				
Spill Response	Protective Booming		Mecl	hanical Recovery	Shoreline Clear	nup	Othe	er Challenges			
Spin Response	High currents a kt will reduce b effectiveness, containment an diversionary bc configurations angled to preve entrainment and over; exclusion deflection confi to be used to pr sensitive areas.	d d oom to be nt d splash and igurations rotect	rapid s reduce recover mobiliz propell up show	vaporation and preading will amount that can be red mechanically; ze floating self- ed skimmers; set reline containment areas with vacuum- and skimmers.	About 2% is anticip to cause shoreline contamination. Perf SCAT; wetland flux some substrate rem due to penetration of sandy beaches; oile structures; oiled del removal.	form shing; oval on d dock	oil in hig areas; we may be c disturbar during re cause eff for entra water co water int	I for submerged th-sediment etland access thallenge; the of wetlands esponse may fects; potential inment of 31% in lumn leading to take and fish kill t; perform water racking.			

Kingston 150,000-bbl Home Heating Oil Spill (Spring-Low Tide) Response

	,									gii iiue)		
~ .	Loca		So	ource	V	olume		Oil Ty	pe	Season		Tide Stage
Scenario Description	Propo King Ancho	ston	ATB	collision	15	0,000 bbl	Н	ome he oil		Summer		High
Spill		Annu	ial Prob	ability Any	where	e in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	S	pill of Type	and `	Volum	e	US		Hudson
		0.7	732			0.000	00015	5		0		0
Conditions	Lat/			ase Rate	Da	Release ate/Time		Model 1 Durati		Winds		Water Temperature
Conditions	41.93 -73.93			00 bbl/hr er 4 hrs		1gust 2016):00am	Dam 50 days		ys	Light / variable (<5 kts)		75°F
				Mass B	alance	at End of M	lode	l Run (After 30	Days)		
	Fate	Surf	ace	Atmospl	here	Water Column	l	Se	diment	Ashore	e	Degraded
	%	0.3	%	66.3%	6	21.1%		(0.8%	3.2%		8.4%
SIMAP Modeling	bbl	38	0	99,44	43 31,609 1,180				4,758		12,630	
Results			Spatial Extent of		Expo	sure over Th	nresh	old (U	p to 30 I	Days After Spi	ll)	
	Water (Volume) – Ecol		e) – Ecological Sur		face (Area x	x Day	ys Expo	osed)	Shore	eline	(Length)	
	Who					cological	Socioeconomic			Ecologica		Socioeconomic
	(1 mg/l) (0.001 mg/l) 190,327 mil gal 214,927 mil gal					10 g/m ²) 6 mi ² -days		(0.01 g		(100 g/m ² 89 mi)	(1 g/m ²) 108 mi
	190,327	190,327 mil gal 214,927 mil gal 266 mi ² -days 268 mi ² -days 89 mi Shoreline Exposure by Shore Type (Miles over Ecological Threshold)							108 III			
		Unconcol										
	Be	drock		Rock	areu	Sand Beach Mud or Timber Artifi		Artificial Shore				
	15	.6 mi						5.2 mi		0 mi		
Ecological		Bra	ckish/E	stuarine W	etland Habitats Exposed (Miles over				-			
Shoreline	Salt	marsh	U	pper Inter Mix	tidal	Lower In		idal		ragmites /etland		rub/Scrub and rested Wetland
Exposures	() mi		0 mi		0 mi			V	0 mi	FU	0 mi
			Freshw	-	nd Hal			Miles o	ver Ecol		old)	0 111
	Freshwater Wetland Habitats Exposed (Miles over Ecological Threshold) Cetteil Memb Upper Intertidal Lower Intertidal Phragmites Shrub/Scrub and Shrub/Scrub/Scrub/Scrub and Shrub/Scrub and Shrub/Scrub and Shrub/S									nrub/Scrub and		
	Catta	il Marsh		Mix		М				etland		orested Wetland
	2.9 mi 11.5 mi 1.7 mi								0.2 mi		0.3 mi	
										onse Operatio		
Socioeconomic Impacts	108 mile beaches, would be commerce and on the the river Ewen M	es of shore parks, an e focused cial prope ne east sh . Water ir ile 89; Hy	eline wo ad real es on areas erty, and ore from takes th yde Park	uld be oiled state would s more heav shorefront h Hyde Park at may be a Mile 80; Pe	l above be affe ily oile real est to Hue ffected oughke	the level of e cted by oil, i ed (about 89 r ate would be dson. Addition include: Uls	conce nclue miles mos onal i ter M 7; Hi	ern for ding res 3). Rive at affect impacts file 96; ighland	socioeco sidue and rside par ed on the may be Rondou	nomic effects; l odor. SCAT c ks, marinas, be e west shore fre experienced in t Mile 92; Rhin	shor opera eache om E othe nebec	sopus to Catskill,

Kingston 150,000-bbl Home Heating Oil Spill (Summer-High Tide) Effects

	-			• .		-		
			F	Response Equipment	t and Plan Activatio	n		
	NCP and		Tier	Response Requiren	nents	G		Ss Activated ays)
	USCG Type	Tier 1 (2	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major WCD	25,000 ft b 1,000 ft + 1 skimming 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage]	n/a	33 river miles Mile 80-113 2016-55 to 2016-30
]	Response	e Overview: Expecte		hallenge	s	
Spill Response	Protective Booming		Mech	nanical Recovery	Shoreline Cleanup		Othe	er Challenges
	High currents v boom effectives containment an diversionary bo configurations angled to preve entrainment and over; exclusion deflection confi to be used to pr sensitive areas.	ness, d oom to be nt d splash and igurations	rapid s reduce recover mobiliz propell up show	vaporation and preading will amount that can be red mechanically; ze floating self- ed skimmers; set reline containment areas with vacuum- and skimmers.	About 3% is anticip to cause shoreline contamination. Perf SCAT; wetland flux some substrate rem due to penetration of sandy beaches; oile structures; oiled del removal.	form shing; oval on ed dock	oil in hig areas; we be challe of wetlan response effects; p entrainm column b intake ar	for submerged gh-sediment etland access may enge; disturbance hds during may cause potential for 21% ent in water leading to water hd fish kill s; perform water tracking.

Kingston 150,000-bbl Home Heating Oil Spill (Summer-High Tide) Response

	,		-		3		<u> </u>					
~ .	Loca		Se	ource	V	olume		Oil Ty	pe	Season		Tide Stage
Scenario Description	Propo King Ancho	ston	ATB	collision	150	0,000 bbl	H	ome he oil	-	Summer		Low
Spill		Annu	ial Prob	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	S]	pill of Type	and `	Volum	e	US		Hudson
-		0.7	732			0.000	00015	5		0		0
Conditions	Lat/			ase Rate	Da	Release ite/Time		Model 1 Durati		Winds		Water Temperature
Conditions	41.93 -73.93			00 bbl/hr er 4 hrs		igust 2016 5:30am		30 da	ys	Light / varial (<5 kts)	ble	75°F
				Mass B	alance	at End of M	lode	Run (After 30 Days)				
	Fate	Surf	ace	Atmosph	nere	Water Column	L	See	diment	Ashore	e	Degraded
	%	0.2	%	66.2%	b	21.2%		(0.6%	3.2%		8.6%
SIMAP	bbl	30	1	99,324	4	31,830			889	4,764	12,892	
Modeling Results			Spatia	al Extent of	Expo	sure over Th	nresh	old (U	p to 30 I	Days After Spi	ll)	
	Wate	r (Volum	e) – Eco	ological	Sur	face (Area x	Day	s Expo	osed)	Shore	eline	(Length)
		le Oil		ssolved	Ecological Socioeconomi (10 $\sigma(m^2)$ (0.01 $\sigma(m^2)$							Socioeconomic
	(1 n	0 /		01 mg/l)		$\frac{10 \text{ g/m}^2}{2 1}$		(0.01 g		(100 g/m ²)	(1 g/m²) 114 mi
	196,345 mil gal 239,059 mil gal 264 mi ² -days 266 mi ² -days 91 mi Shoreline Exposure by Shore Type (Miles over Ecological Threshol)							1)	114 mi			
				Unconsolidated						ical Inresnol	a)	
	Be	drock		Rock	ateu	Sand 1	Beac	h	Mud	or Timber	A	Artificial Shore
	12	.1 mi		35 mi		2.1	mi 2			1.3 mi		0 mi
Faclasias		Bra	ckish/E	stuarine W	etland	Habitats Ex	xpose	ed (Mil	es over l	Ecological Th	resh	old)
Ecological Shoreline	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites /etland		hrub/Scrub and prested Wetland
Exposures	() mi		0 mi		0 1				0 mi		0 mi
			Freshw	ater Wetla	nd Ha	bitats Expos	ed (N	Ailes o	ver Ecol	ogical Thresh	old)	
	Cattail MarshUpper Intertidal MixLower Intertidal MixPhragmites WetlandShrub/Scrub and Forested Wetland											
	3.	3 mi		13.8 mi		1.9	mi		(0.5 mi		1.1 mi
						-		-		onse Operatio		
Socioeconomic Impacts	114 mile beaches, would be commerc Coxsack towns ale Mile 92;	s of shore parks, ar e focused cial prope ie, and or ong the ri Port Ewe	eline wo ad real es on areas erty, and a the easi iver. Wa en Mile 8	uld be oiled state would s more heav shorefront t t shore from ter intakes t 89; Hyde Pa	above be affe ily oile real est Stuyv hat ma urk Mil	the level of of cted by oil, i d (about 91) ate would be esant to Hyd y be affected	conce ncluc miles mos e Par inclu ceeps	ern for ling res). Rive t affect k. Add ude: Ul ie Mile	socioeco sidue and rside par ed on the litional ir ster Mile 277; Higl	nomic effects; dodor. SCAT c ks, marinas, be e west shore fro npacts may be 96; Rondout I hland Mile 76.	shor opera eache om E expe Mile	sopus to crienced in other 92; Rhinebeck

Kingston 150,000-bbl Home Heating Oil Spill (Summer-Low Tide) Effects

			I	Response Equipmen	t and Plan Activati	on	-	-
	NCP and		Tier	Response Requiren	nents	G		Ss Activated lays)
	USCG Type	Tier 1 (2	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major WCD	25,000 ft b 1,000 ft + 1 skimming 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage		/a	43 river miles Mile 80-123 2016-55 to 2016-23
]	Respons	e Overview: Expect	ted Outcomes and O	and Challenges		•
Spill Response	Protective B	Protective Booming		hanical Recovery	Shoreline Clea	anup	Oth	er Challenges
	High currents a kt will reduce b effectiveness, containment an diversionary bo configurations angled to preve entrainment and over; exclusion deflection confi to be used to pr sensitive areas.	d d oom to be nt d splash and igurations rotect	rapid s reduce recove mobili propel up sho boom	vaporation and preading will amount that can be red mechanically; ze floating self- led skimmers; set reline containment areas with vacuum- and skimmers.	About 3% is antic to cause shoreline contamination. Pe SCAT; wetland fl some substrate ren due to penetration sandy beaches; oil structures; oiled d removal.	erform ushing; noval on led dock	oil in hi, areas; w be chall of wetla response effects; entrainm column intake a concern	I for submerged gh-sediment vetland access may enge; disturbance inds during e may cause potential for 21% nent in water leading to water nd fish kill s; perform water tracking.

Kingston 150,000-bbl Home Heating Oil Spill (Summer-Low Tide) Response

Ringston	-					<u> </u>	È		- <u></u>			
Scenario	Loca		So	ource	``	olume		Oil Type		Season		Tide Stage
Description	Prope King Anche	ston	ATB	collision	150	0,000 bbl	He	ome heating oil	5	Winter		High
Spill		Annı	ial Prob	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any V	Volume)	S	pill of Type	and V	Volume		US		Hudson
		0.7	732			0.000	00015	5		0		0
Conditions	Lat/		Relea	ase Rate	Da	Release ate/Time		Aodel Run Duration		Winds		Water Temperature
Conditions	41.93 -73.93			00 bbl/hr er 4 hrs		uary 2016 3:00am		30 days	Ι	ight / variab. (<5 kts)	ole	32°F
				Mass B	alance	at End of M	lodel	Run (Afte	r 30 D	Days)		
	Fate	Surf	àce	Atmospl	nere	Water Column	1	Sedime	nt	Ashore	e	Degraded
	%	10.	5%	64.6%	6	8.6%		0.9%		7.1%	8.2%	
SIMAP Modeling	bbl	15,7	790	96,87	1	12,966		1,379)	10,666	ó	12,328
Results			Spatia	al Extent of	Expos	sure over Th	nresh	old (Up to	30 Da	ys After Spi	ll)	
	Wate	r (Volum	e) – Eco	ological	Sur	face (Area x	x Day	s Exposed)		Shore	eline	(Length)
		(1 mg/l) (0.001 mg/l) (10 g/m ²) (0.01 g/m ²) (100 g/m ²) (1 g/m ²)										Socioeconomic (1 g/m ²)
	219,259	mil gal	205,46	51 mil gal	361	mi ² -days	ni ² -days 443 mi ² -days					136 mi
		Shoreline Exposure by Shore Type (Miles over Ecol					ologic	al Threshol	d)			
	Be	drock	ι	Unconsolida Rock	ated	Sand	Beac	h N	lud or	[.] Timber	A	Artificial Shore
	19).1 mi		81.6 mi		0.7	mi		9.2	2 mi		0 mi
Ecological		Bra				Habitats Ex	-					
Shoreline Exposures	Salt	tmarsh	U	pper Inter Mix	tidal	Lower In M		idal		gmites tland		hrub/Scrub and prested Wetland
Enposuros	() mi		0 mi		0 1	mi		0	mi		0 mi
						bitats Expos						
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		gmites tland		nrub/Scrub and prested Wetland
	0.	.8 mi		6.6 mi		1.9	mi		0	mi		0.3 mi
			Poten	tial Socioed	conomi	ic Impacts fi	rom S	Spill and R	espon	se Operatio	ns	
												t several days.
												efront marinas, tions and cleanup
Socioeconomic												nes, industry,
Impacts						ate would be						
	Lloyd, and on the east shore from Poughkeepsie to Red Hook. Additional impacts may be experienced in other towns along the river. Water intakes that may be affected include: Ulster Mile 96; Rondout Mile 92; Rhinebeck											
	Mile 92; Port Ewen Mile 89; Hyde Park Mile 80; Poughkeepsie Mile 77; Highland Mile 76; IBM Mile 72;											
	Danskammer Mile 66; Chelsea Mile 66. Additional precautionary fishing advisories would likely be in much or all of the river.									be instituted for		
	much of	an or the	11001.									

Kingston 150,000-bbl Home Heating Oil Spill (Winter-High Tide) Effects

				Response Equipmen	t and Plan Activati		/	
	NCP and		Tier	Response Requiren	nents	G		Ss Activated lays)
	USCG Type	Tier 1 (24	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n,	/a	30 river miles Mile 100-70 2016-39 to 2016-61
]	Respons	e Overview: Expect	ted Outcomes and O	Challenge	s	
	Protective B	Booming	Mec	hanical Recovery	Shoreline Clea	anup	Oth	er Challenges
	Ice conditions		65% evaporation and		About 7% is anticipated			l for submerged
Spill Response	response operation			preading will	to cause shoreline			gh-sediment
	currents will re	duce boom		amount that can be	contamination. Pe	-		vetland access may
	effectiveness, containment an	d		red mechanically; ze floating self-	SCAT; wetland fly			enge; disturbance
	diversionary bo			led skimmers; set	some substrate removal due to penetration on			e may cause
	configurations			reline containment	sandy beaches; oil			potential for 9%
	angled to preve			areas with vacuum-	structures; oiled d			nent in water
	entrainment and		trucks	and skimmers.	removal.		column	leading to water
	over; exclusion			ial ice conditions			intake a	nd fish kill
	deflection configuration to be used to protect		configurations may affect mechanical				s especially in	
			recove	ry operations.				ar the spill site
	sensitive areas.							dilution; perform
	Potential ice co may affect boo						water co	olumn tracking.
	deployment.	111						

Kingston 150,000-bbl Home Heating Oil Spill (Winter-High Tide) Response

•	-						<u> </u>					
G .	Loca		So	ource	V	olume		Oil Ty	pe	Season		Tide Stage
Scenario Description	Propo King Ancho	ston	ATB	collision	150	0,000 bbl	Но	ome he oil	ating	Winter		Low
Spill		Annı	ıal Prob	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any V	Volume)	S	pill of Type	and V	Volum	e	US		Hudson
		0.7	732			0.000	00015	5		0		0
Conditions	Lat/			ase Rate	Da	Release ite/Time		Aodel I Durati		Winds		Water Temperature
Conditions	41.93		· · · ·	00 bbl/hr er 4 hrs		anuary 5 9:00am		30 da	ys	Light / variab (<5 kts)	le	32°F
				Mass B	alance	at End of M	lodel	Run (After 30	Days)		
	Fate	Surf	face	Atmospl	here	Water Column	1	Sec	liment	Ashore	e	Degraded
	%	10.7	7%	64.4%	6	8.6%		().7%	7.1%		8.5%
SIMAP Modeling	bbl	16,0)85	96,59	92 12,857			1	,111	10,678		12,678
Results					f Exposure over Threshold (U			old (Uj	p to 30 E	Days After Spi	ll)	
	Water (Volume) – Ecological			ological	Sur	face (Area x	x Day	's Expo	osed)	Shore	eline	(Length)
	Whole Oil (1 mg/l)Dissolved0.001 mg/l)					cological	Socioeconom			Ecological		Socioeconomic
	214,377	0 /			1 mg/l) (10 g/m ²) (0.01 g/m ²) 5 mil gal 373 mi ² -days 448 mi ² -days					(100 g/m ²) 120 mi)	(1 g/m ²) 135 mi
	211,377	Shoreline Exposure by Shore Type (Miles over Ecological Threshold)									100 III	
	Be				ated	Sand	Beacl	h	Mud	or Timber	A	Artificial Shore
	18	8.6 mi		80.6 mi 0.9 mi				ç	9.4 mi		0 mi	
E e le chert		Bra	ckish/E	Estuarine Wetland Habitats Exposed (Miles over			es over l	er Ecological Th		old)		
Ecological Shoreline	Salt	marsh	U	pper Inter Mix	ertidal Lower Intertidal Mix				Phragmites Wetland		hrub/Scrub and prested Wetland	
Exposures	0) mi		0 mi		0 1				0 mi		0 mi
			Freshwa	ater Wetla	nd Hal	bitats Expos	ed (N	Ailes o	ver Ecol	ogical Thresh	old)	
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites /etland		hrub/Scrub and prested Wetland
	0.	.9 mi		7.1 mi		2.3	mi			0 mi		0.3 mi
			Poten	tial Socioed	conomi	ic Impacts fi	rom S	Spill ar	nd Respo	onse Operatio	ns	
Socioeconomic Impacts	135 mile beaches, would be commerce Lloyd, and towns ale Mile 92;	es of shore parks, an e focused cial prope nd on the ong the ri Port Ewe	eline wor ad real es on areas erty, and east sho iver. Wat en Mile 8	uld be oiled state would s more heav shorefront to re from Pou ter intakes t 89; Hyde Pa	l above be affe ily oile real est ighkee hat ma ark Mil	the level of a cted by oil, i d (about 120 ate would be psie to Red F y be affected e 80; Poughk	conce nclud mile most Hook. inclu	ern for ling res s). Riv t affect Additi ude: Ul ie Mile	socioeco idue and erside pa ed on the onal imp ster Mile 77; Higl	nomic effects; odor. SCAT o rks, marinas, b west shore fro acts may be ex	shor opera oeach om S operi Mile IBM	augerties to enced in other 92; Rhinebeck 1 Mile 72.

Kingston 150,000-bbl Home Heating Oil Spill (Winter-Low Tide) Effects

·	-		I	Response Equipmen	t and Plan Activati			•
	NCP and			Response Requiren				Ss Activated lays)
	USCG Type	Tier 1 (24	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n	/a	27 river miles Mile 100-73 2016-39 to 2016-60
		J	Respons	e Overview: Expect	ted Outcomes and O	Challenge	S	
	Protective B	Booming	Mec	hanical Recovery	Shoreline Clea	anup	Oth	er Challenges
	Ice conditions	2		nditions may hinder	About 7% is anticipated			al for submerged
Spill Response	response operation		n evaporation and rapid		to cause shoreline			gh-sediment
	currents will re	duce boom			contamination. Perform			vetland access may
	effectiveness, containment an	d		ing will reduce	SCAT; wetland flush some substrate remov			enge; disturbance
	diversionary bo			red mechanically;	due to penetration			nds during e may cause
	configurations			ze floating self-	sandy beaches; oil			potential for 9%
	angled to preve			led skimmers; set	structures; oiled d			nent in water
	entrainment and			reline containment	removal.			leading to water
	over; exclusion					nd fish kill		
	deflection configurations		trucks	and skimmers.				s especially in
	to be used to protect sensitive areas.			ial ice conditions				ear spill site prior
				ffect mechanical				on; perform water
	Potential ice co		recove	ry operations.			column	tracking.
	may affect boo	m						
	deployment.							

Kingston 150,000-bbl Home Heating Oil Spill (Winter-Low Tide) Response

Proposed Kingston Anchorage 150,000-bbl Diluted Bitumen Oil Spill

Kingston 150,000-bbl Diluted Bitumen Spill (Spring-High Tide) Effects

	Loca	tion	So	ource	V	olume		Oil Type		Season		Tide Stage
Scenario Description	Propo King Ancho	ston	ATB	collision	150),000 bbl	Dil	uted Bitume	n	Spring		High
Spill		Annua	l Proba	bility Any	where	in Hudson I	River	•				ual Frequency 2015)
Probability	Spi	ll of Type	(Any V	olume)	S	pill of Type	and	Volume		US		Hudson
		0.73	32			0.000	0015	5		0		0
	Lat/	Lon	Relea	ase Rate		Release ite/Time		Aodel Run Duration		Winds		Water Temperature
Conditions	41.9 -73.9	93017 5700		00 bbl/hr er 4 hrs		pril 2016 3:00am		30 days	15 kts			48°F
			•	Mass Ba	lance a	nt End of M	odel	Run (After	30 D	Days)		
	Fate	Surfa	ace	Atmosph	nere	Water Column		Sedime	ıt	Ashore	•	Degraded
	%	51.5	%	28.2%	6	1.2%		0.6%		5.6%		4.4%
SIMAP Modeling	bbl	77,1	92	42,24	5	1,730	843		8,361		6,540	
Results			Spatial	Extent of I	Exposi	ire over Thi	esho	old (Up to 3) Da	ys After Spil	• *	
	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (L										(Length)	
	Whol (1 n	le Oil ng/l)		ssolved 01 mg/l)		Ecological (10 g/m ²)		Socioeconomic (0.01 g/m ²)		Ecological (100 g/m ²)		Socioeconomic (1 g/m ²)
	70,481			74 mil gal		mi ² -days		85 mi ² -days		184 mi	,	304 mi
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
	Bee	drock	τ	Jnconsolida Rock	ated	Sand 1	Beac	h M	ud o	r Timber	A	Artificial Shore
	21	.8 mi		120.3 m	i	0.4	mi		18	.7 mi		0 mi
Facloriael		Bracl	kish/Est	uarine We	tland l	Habitats Exp	posed	d (Miles ove	r Ec	ological Thr	esho	old)
Ecological Shoreline	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		ngmites etland		nrub/Scrub and prested Wetland
Exposures	1.	.6 mi		1.1 mi		0.2	mi			7 mi		0 mi
		F	reshwat	er Wetlan	d Habi	itats Expose	d (M	liles over E	olog	ical Thresho	old)	
	Cattail March 11									hrub/Scrub and prested Wetland		
	2.	.1 mi		11.7 mi		2 1	ni		C) mi		0.3 mi
						=		=	-	se Operation		
Socioeconomic Impacts	304 miles beaches, j would be commerci Cornwall, towns alo Ewen Mil 66; Chelso	of shoreli parks, and focused o ial propert , and on th ong the rive le 89; Hyd	ine woul real esta n areas r y, and sl e east sh er. Wate e Park M 5; Roseto	d be oiled a atte would b nore heavil norefront re nore from R r intakes the file 80; Pou	above t e affec y oiled eal esta hinebe at may ughkee	he level of co ted by oil, in (about 184) te would be cck to Beacon be affected i psie Mile 77	oncen cludi miles nost n. Ad nclu : Hig	rn for socioe ing residue a s). Riverside affected on lditional imp de: Rondout hland Mile	conc nd o park the v acts Mile 76; I	omic effects; s dor. SCAT op as, marinas, b vest shore fro may be expe e 92; Rhinebe BM Mile 72;	shor perate each om K rienc eck M Dan	ingston to ced in other

illigoton		Bildtoo			<u></u>	1100/	1000	
			R	esponse Equipment	and Plan Activatio	n		
	NCP and		Tier	Response Requiren	nents	G		Ss Activated ays)
	USCG Type	Tier 1 (24	hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major WCD	25,000 ft bo 1,000 ft + 3 skimming s 1,875 bbl/d 3,750 bbl st	00 per ystem ay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n	ı/a	30 river miles Mile 90-60 2016-47 to 2016-69
		Re	esponse	Overview: Expecte	d Outcomes and Cl	• · · · · · · · · · · · · · · · · · · ·		
	Protective B	ooming	Mec	hanical Recovery	Shoreline Clea	nup	Oth	er Challenges
Spill Response ⁹	An average currer velocity of 1 kt r high currents w r boom effectivene containment and diversionary boo configurations to to prevent entrain splash over; excl deflection config be used to protect areas.	esults in reducing ess, om o be angled nment and usion and gurations to	veloci skimn evapor spread amour recove mobili propel up sho boom	ge 1 kt current ties may affect ner operations, 28% ration and rapid ling will reduce nt that can be ered mechanically; ize floating self- lled skimmers; set oreline containment areas with vacuum- and skimmers.	Approximately 6% impact on shorelin Perform SCAT; w flushing; some sub removal due to penetration on san beaches; oiled doc structures; oiled doc removal.	ie. etland ostrate dy k	oil in hig especial evaporat access n disturba during n cause ef for 1% e water co- lead to v fish kill near spil dilution; column bottom o determin submerg bottom I	l for submerged gh-sediment areas ly as the diluents te; wetland nay be challenge; nce of wetlands esponse may fects; potential entrainment in olumn which may vater intake and concerns in areas ll site prior to concerns mater tracking, perform drags to he extent of ged oil on river nowever at $<1\%$, be detectable.

Kingston 150,000-bbl Diluted Bitumen Spill (Spring-High Tide) Response

⁹ Non-floating oil, therefore OSROs are required to be certified having capabilities as follows: detection; recovery; storage; and optional containment for submerged oil.

⁵⁸ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

	-												
Scenario	Loca		Sc	ource	1	olume		Oil Ty	pe	Season		Tide Stage	
Description		Kingston orage	ATB	collision	15	0,000 bbl	Dil	luted B	itumen	Spring		Low	
Spill		Annua	l Proba	bility Any	where	in Hudson I	River	•				ual Frequency 2015)	
Probability	Spi	ill of Type	(Any V	olume)	S	pill of Type	and	Volum	ie	US		Hudson	
		0.73	32			0.000	0015	5		0		0	
Conditions	Lat/	Lon	Relea	ase Rate		Release nte/Time		Model 1 Durati		Winds		Water Temperature	
Conditions	41.93 -73.9			00 bbl/hr er 4 hrs	1	pril 2016 1:00am		30 da		South / moder (4-15 kts)	rate	48°F	
				Mass Ba	lance a	at End of M	odel	Run (A	After 30	Days)			
	Fate	Surfa	ice	Atmospl	nere	Water Column	L	Sec	liment	Ashore	e	Degraded	
	%	51.9	%	28.1%	6	1.2%		().8%	6.1%		4.5%	
SIMAP	bbl	77,8	96	42,08	9	1,817 1,163				9,184		6,789	
Modeling Results			Spatial	Extent of l	Exposi	ire over Thi	esho	old (Up	to 30 D	ays After Spill)			
	Water	r (Volume) – Ecol	ogical	Sur	face (Area x	Day	ys Expo	osed)	Shore	eline	(Length)	
		Whole Oil (1 mg/l) Dissolved (0.001 mg/l) Ecological (10 g/m ²) Socioeconomic (0.01 g/m ²) Ecol (100										Socioeconomic (1 g/m ²)	
	83,502	mil gal	183,61	16 mil gal	193	mi ² -days 193 mi ² -days				193 mi		321 mi	
				-	Exposure by Shore Type (Miles over Ecolo					ological Threshold)			
	Be	drock	τ	Jnconsolid Rock	ated	Sand	Beac	h	Mud	or Timber	A	Artificial Shore	
	22	2.9 mi		125.8 m	i	0.6	mi		1	9.7 mi		0 mi	
Ecological		Brack							es over H	cological Thr			
Shoreline Exposures	Salt	tmarsh	U	pper Inter Mix	tidal	Lower In		idal		ragmites Vetland		hrub/Scrub and prested Wetland	
Exposures	1.	.6 mi		1.3 mi		0.2	mi			2.8 mi		0 mi	
		F								ogical Thresho			
	Cattail MarshUpper Intertidal MixLower Intertidal MixPhragmites WetlandShrub/Scrub an Forested Wetland												
	2.	.6 mi		12.7 mi		2.4	mi			0 mi		0.3 mi	
										nse Operation			
Socioeconomic Impacts	321 miles beaches, j would be commerc: Cornwall towns alo Ewen Mii 66; Chels	s of shoreli parks, and focused or ial propert , and on th ong the rive le 89; Hyd	ne woul real esta n areas r y, and sl e east sh er. Wate e Park M c; Roseto	d be oiled a ate would b nore heavil horefront re nore from R r intakes th Aile 80; Poo	above t e affec y oiled al esta hinebe at may ighkee	he level of c ted by oil, in (about 193) te would be cck to Philips be affected i psie Mile 77	oncer cludi miles most towr inclu ; Hig	rn for s ing resi s). Rive affecte n. Addi de: Ron ghland	ocioecon due and erside pa ed on the tional im ndout M Mile 76;	odor. SCAT o rks, marinas, b west shore fro pacts may be ile 92; Rhinebe IBM Mile 72;	shor perat each om E expe eck M Dan	efront marinas, tions and cleanup es, industry, sopus to rienced in other	

Kingston 150,000-bbl Diluted Bitumen Spill (Spring-Low Tide) Effects

Ittingetein				opring-Low	1100)			
			I	Response Equipmen	t and Plan Activati	ion		
	NCP and		Tier	Response Requiren	nents	GF		Ss Activated ays)
	USCG Type	Tier 1 (24	hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail N	Miles	River Miles
	Major WCD	25,000 ft boo 1,000 ft + 30 skimming sy 1,875 bbl/da 3,750 bbl sto	00 per ystem y	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n/	a	34 river miles Mile 92-58 2016-46 to 2016-75
			<u> </u>	e Overview: Expect	-		6	
	Protective I	Booming	Me	chanical Recovery	Shoreline Cle	eanup	Oth	er Challenges
Spill Response ¹⁰	An average cur velocity of 1 kt high currents w boom effective containment an diversionary bo configurations to to prevent entra splash over; exc deflection confi be used to prote areas.	results in reducing ness, d oom to be angled inment and clusion and igurations to	veloc skim evap sprea amou recov mobi propo up sh boom	age 1 kt current cities may affect mer operations, 28% oration and rapid uding will reduce unt that can be vered mechanically; lize floating self- elled skimmers; set noreline containment n areas with vacuum- ts and skimmers.	flushing; some su removal due to penetration on sa beaches; oiled do structures; oiled removal.	ine. wetland ubstrate undy ock	oil in hi areas es diluents wetland challeng wetland may cau potentia entraini column to water kill con near spi dilution column bottom determi submer bottom	al for submerged igh-sediment specially as the s evaporate; l access may be ge; disturbance of ls during response use effects; al for 1% ment in water which may lead r intake and fish cerns in areas ill site prior to tracking, perform drags to ne extent of ged oil on river however at <1%, t be detectable.

Kingston 150,000-bbl Diluted Bitumen Spill (Spring-Low Tide) Response

¹⁰ Non-floating oil, therefore OSROs are required to be certified having capabilities as follows: detection; recovery; storage; and optional containment for submerged oil.

⁶⁰ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

	,											
	Loca	LocationSourceVolumeOil TypeSeasonTide StageProposed KingstonATB collision150,000 bblDiluted BitumenSummerHigh								Tide Stage		
Scenario Description		ston	ATB	collision	150),000 bbl	Di	luted B	itumen	Summer		High
Spill		Annua	l Proba	bility Any	where	in Hudson I	River	r				ual Frequency 2015)
Probability	Spi	ll of Type	(Any V	olume)	S	pill of Type	and	Volum	e	US		Hudson
		0.73	32			0.000	0001	5		0		0
Conditions	Lat/			ase Rate	Da	Release ate/Time		Model l Durati		Winds		Water Temperature
Conditions	41.93 -73.93			00 bbl/hr er 4 hrs		ugust 2016 0:00am		30 day	/S	Light / varial (<5 kts)	ole	75°F
				Mass Ba	lance a	nt End of M	odel	Run (A	After 30	Days)		
	Fate	Surfa	ace	Atmosph	nere	Water Column		Sed	liment	Ashore	:	Degraded
	%	58.9	%	28.9%	0% 1.3% 0.8%					6.0%		4.1%
SIMAP Modeling	bbl	88,3	36 43,315 1,924 1,157					9,075		6,201		
Results			Spatial	Extent of l	Exposi	ire over Thi	esho	old (Up	to 30 D	ays After Spil	ll)	
	Water	r (Volume) – Ecol	logical	Sur	face (Area x	Day	ys Expo	osed)			(Length)
		Whole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 g/m²)Socioeconomic (0.01 g/m²)Ecological (100 g/m²)Socioeconomic (100 g/m²)Socioeconomic (100 g/m²)Socioeconomic (100 g/m²)										
	53,137			23 mil gal		mi ² -days		11 mi^2 -		135 mi	,	139 mi
			Shoreli	ine Exposu	re by S	Shore Type	(Mil	es over	Ecolog	cal Threshold	i)	
	Be	drock	ι	Jnconsolida Rock	ated	Sand	Beac	ch	Mud	or Timber	A	Artificial Shore
	16	6.4 mi		50.2 mi		2.2	mi		3	2.1 mi		0 mi
Ecological		Bracl	kish/Est	uarine We	tland l	Habitats Ex	pose	d (Mile	s over H	cological Thr	esho	old)
Ecological Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		tidal		ragmites Vetland		rub/Scrub and rested Wetland
Exposures	0) mi		0 mi		0 1	mi			0 mi		0 mi
	Freshwater Wetland Habitats Exposed (Miles over Ecological Threshold)											
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		tidal		ragmites Vetland		rub/Scrub and rested Wetland
	5.	.6 mi		23.1 mi		3.9				0.2 mi		1.7 mi
										nse Operation		t several days.
Socioeconomic Impacts	139 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and real estate would be affected by oil, including residue and odor. SCAT operations and cleanup would be focused on areas more heavily oiled (about 135 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Catskill to Milton, and on the east shore from Hudson to Poughkeepsie. Additional impacts may be experienced in other towns along the river. Water intakes that may be affected include: Ulster Mile 96; Rondout Mile 92; Rhinebeck Mile 92; Port Ewen Mile 89; Hyde Park Mile 80; Poughkeepsie Mile 77; Highland Mile 76; IBM Mile 72. Additional precautionary fishing advisories would likely be instituted for much or all of the river.											

Kingston 150,000-bbl Diluted Bitumen Spill (Summer-High Tide) Effects

Ringston									
			R	esponse Equipment	and Plan Activation				
	NCP and		Tier	Response Requirem	nents	G	RPs/ GRS (7 d	s Activated ays)	
	USCG Type	Tier 1 (24	hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rai	l Miles	River Miles	
	Major WCD	25,000 ft boo 1,000 ft + 30 skimming sy 1,875 bbl/da 3,750 bbl sto	00 per stem y	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n/a		40 river miles Mile 115-75 2016-28 to 2016-58	
		R	esponse	e Overview: Expecte	d Outcomes and Cha	allenges	llenges		
	Protective 1	Booming	Mec	hanical Recovery	Shoreline Clean	up	Othe	r Challenges	
Spill Response ¹¹	An average cur velocity of 1 kt high currents w boom effectives containment an diversionary bo configurations to prevent entra splash over; exc deflection confi to be used to pr sensitive areas.	results in reducing ness, d oom to be angled inment and clusion and igurations	veloci skimn evapo spread amoun recove mobil prope up sho boom	age 1 kt current ties may affect ner operations, 28% ration and rapid ding will reduce nt that can be ered mechanically; ize floating self- lled skimmers; set oreline containment areas with vacuum- and skimmers.	Approximately 6% impact on shoreline Perform SCAT; wet flushing; some subs removal due to penetration on sand beaches; oiled dock structures; oiled det removal.	tland strate y	oil in hig especially evaporate access ma disturban during re cause effe for 1% er water col lead to w fish kill c near spill dilution; column to bottom di determine submerge bottom ho	for submerged h-sediment areas y as the diluents e; wetland ay be challenge; ce of wetlands sponse may ects; potential ntrainment in umn which may ater intake and concerns in areas site prior to perform water racking, perform rags to e extent of ed oil on river owever at $<1\%$, pe detectable.	

Kingston 150,000-bbl Diluted Bitumen Spill (Summer-High Tide) Response

¹¹ Non-floating oil, therefore OSROs are required to be certified having capabilities as follows: detection; recovery; storage; and optional containment for submerged oil.

⁶² Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

3	,	Location Source Volume Oil Type Season Tide Stage Proposed												
	Loca	Proposed								Tide Stage				
Scenario Description		ston	ATB	collision	15	0,000 bbl	Di	luted B	itumen	Summer		Low		
Spill		Annua	ıl Proba	bility Any	where	in Hudson I	Rive	r				ual Frequency 2015)		
Probability	Spi	ll of Type	(Any V	olume)	S	pill of Type	and	Volum	e	US		Hudson		
		0.7	32			0.000	0001	5		0		0		
Conditions	Lat/	-		ase Rate	Da	Release ite/Time	I	Model I Durati		Winds		Water Temperature		
	41.93 -73.93		,	00 bbl/hr er 4 hrs		1gust 2016 5:30am		30 da	ys	Light / varia (<5 kts)	ble	75°F		
				Mass Ba	lance a	at End of Mo	odel	Run (A	After 30	Days)				
	Fate	Surf	ace	Atmosph	nere	Water Column		Sed	iment	Ashore	:	Degraded		
	%	59.0	%	28.9%	6	1.2%		0	.8%	5.9%		4.2%		
SIMAP	bbl	88,4	86 43,325 1,736 1,188					8,922		6,350				
Modeling Results			Spatial	Extent of l	Exposi	ire over Thr	esho	old (Up	to 30 D	ays After Spil	I)			
	Water	r (Volume	e) – Ecol	ogical	Sur	face (Area x	Day	ys Expo	osed)	Shore	eline	(Length)		
		Whole Oil (1 mg/l) Dissolved (0.001 mg/l) Ecological (10 g/m ²) Socioeconomic (0.01 g/m ²) Ecological (100 g/m ²) Socioeconomic (100 g/m ²) Ecological (100 g/m ²) Socioeconomic (100 g/m ²)										Socioeconomic (1 g/m ²)		
	68,235			45 mil gal		mi ² -days	4	06 mi ² -		131 mi		134 mi		
			Shoreli	ine Exposu	re by S	Shore Type	(Mil	es over	Ecologi	cal Threshold	I)			
	Be	drock	τ	Jnconsolida Rock	ated	Sand 1	Beac	ch	Mud	or Timber	A	Artificial Shore		
	14	.6 mi		45.7 mi		2.2	mi		3	2.9 mi		0 mi		
Francisco		Brac	kish/Est	uarine We	tland l	Habitats Exp	pose	d (Mile	s over E	cological Thr	esho	old)		
Ecological Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		tidal		ragmites /etland		nrub/Scrub and prested Wetland		
Exposures	C) mi		0 mi		0.1	mi			0 mi		0 mi		
		F	reshwat	ter Wetlan	d Habi	itats Expose	d (N	liles ov	er Ecolo	gical Thresho	old)			
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		tidal		ragmites /etland		nrub/Scrub and prested Wetland		
	6.	2 mi		23.8 mi		4.3	mi).2 mi		0.7 mi		
										nse Operatior				
Socioeconomic Impacts	134 miles beaches, j would be commerci and on the river. Wa Ewen Mil	of shorel parks, and focused o ial propert e east shor ter intakes le 89; Hyd	ine woul real esta n areas 1 y, and sl re from I that ma e Park M	d be oiled a ate would b nore heavil horefront re Hudson to H y be affecte Aile 80; Poo	above t e affec y oiled eal esta Hyde P ed inclu ughkee	he level of co ted by oil, in (about 131) te would be 1 ark. Additior 1de: Ulster M	once clud miles nost nal ir file 9 ; Hig	rn for s ing resi s). Rive affecte npacts 1 96; Ron ghland l	ocioecon due and rside par d on the may be e dout Mi	oomic effects; s odor. SCAT op ks, marinas, b west shore fro xperienced in e 92; Rhinebe	shor perate each om A othe ck N	thens to Lloyd, r towns along the		

Kingston 150,000-bbl Diluted Bitumen Spill (Summer-Low Tide) Effects

•		Response Equipment and Plan Activation								
	NCP and		Tier	Response Requirer	nents	G	RPs/ GRS: (7 da	s Activated ays)		
	USCG Type	Tier 1 (2	24 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rai	l Miles	River Miles		
	Major WCD	25,000 ft t 1,000 ft + skimming 1,875 bbl/ 3,750 bbl	300 per system day	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage		n/a	35 river miles Mile 115-80 2016-28 to 2016-55		
					l Outcomes and Cha	allenges	5			
	Protective Bo	oming	Mech	anical Recovery	Shoreline Clean	nup	Other	Challenges		
Spill Response ¹²	An average currer velocity of 1 kt res high currents w re boom effectivenes containment and diversionary boon configurations to 1 to prevent entrain splash over; exclu deflection configu to be used to prote sensitive areas.	tt sults in ducing ss, be angled nent and sion and rations	Average velocitie skimme evapora spreadin amount recover mobiliz propelle up shore boom an	e 1 kt current es may affect er operations, 28% tion and rapid ng will reduce that can be ed mechanically; e floating self- ed skimmers; set eline containment reas with vacuum- ind skimmers.	Approximately 6% impact on shoreline Perform SCAT; we flushing; some subs removal due to penetration on sand beaches; oiled dock structures; oiled del removal.	e. tland strate	Potential oil in high areas espec- diluents e wetland a challenge wetlands may cause potential entrainme column w to water i kill conce near spill dilution; p column tr bottom dr determine submerge bottom ho	for submerged h-sediment ecially as the evaporate; ccess may be ; disturbance of during response e effects; for 1% ent in water which may lead ntake and fish erns in areas site prior to perform water acking, perform		

Kingston 150,000-bbl Diluted Bitumen Spill (Summer-Low Tide) Response

¹² Non-floating oil, therefore OSROs are required to be certified having capabilities as follows: detection; recovery; storage; and optional containment for submerged oil.

⁶⁴ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

.	,								<u>.</u>			
~ .		ocation Source Volume Oil Type Season Tide Stage roposed Lingston ATB collision 150,000 bbl Diluted Bitumen Winter High									Tide Stage	
Scenario Description		gston	ATB	collision	150),000 bbl	Dil	luted B	itumen	Winter		High
Spill		Annua	l Proba	bility Any	where	in Hudson I	River	r				ual Frequency 2015)
Probability	Spi	ll of Type	(Any V	olume)	S]	pill of Type	and	Volum	ie	US		Hudson
		0.73	32			0.000	0001	5		0		0
Conditions	Lat/			ase Rate	Da	telease te/Time		Model I Durati		Winds		Water Temperature
	41.9 -73.9	93017 5700		0 bbl/hr er 4 hrs		uary 2016 :00am		30 da	ys	Light / variat (<5 kts)	ole	32°F
				Mass Ba	lance a	at End of M	odel	Run (A	After 30	Days)		
	Fate	Surfa	ace	Atmospl	nere	Water Column		Sec	liment	Ashore	•	Degraded
	%	57.6	%	28.1%	6	1.4%		0).5%	7.9%		4.6%
SIMAP Modeling	bbl	86,3	47	47 42,136 2,067 790					790	11,808		6,864
Results			Spatial	Extent of l	Exposi	ire over Thi	esho	old (Up	to 30 D	ays After Spi	ll)	
	Water	r (Volume) – Ecol	ogical	Sur	face (Area x	Day	ys Expo	osed)	Shore	eline	(Length)
		Whole OilDissolvedEcologicalSocioeconomicEcologicalSocioeconomic $(1 m \sigma l)$ $(0 001 m \sigma l)$ $(10 \sigma (m^2))$ $(10 \sigma (m^2))$ $(10 \sigma (m^2))$ $(10 \sigma (m^2))$										
		(1 mg/l) (0.001 mg/l) (10 g/m ²) (0.01 g/m ²) (100 g/m ²) (1 g/m ²) 66,709 mil gal 119,254 mil gal 178 mi ² -days 178 mi ² -days 150 mi 157 mi										(I g/m²) 157 mi
	00,709	iiiii gai							5	cal Threshold	1)	137 111
				Jnconsolid	•						-	
	Ве	drock		Rock		Sand 1	Beac	h	Mud	or Timber	A	Artificial Shore
	22	2.8 mi		98.4 mi		1.1	mi		1	3.4 mi		0 mi
Ecological		Brac								cological Thr		
Shoreline	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		nrub/Scrub and prested Wetland
Exposures	() mi		0.1 mi		0 1).5 mi	ľ	0 mi
			reshwat		d Habi			liles ov		gical Thresh	old)	
	Cattail MarshUpper Intertidal MixLower Intertidal MixPhragmites WetlandShrub/Scrub and Forested Wetland											
	1.	.9 mi		9.8 mi		2.3	mi			0 mi		0.3 mi
			Potenti	al Socioeco	onomic	Impacts from	om S	pill an	d Respo	nse Operation	ns	
Socioeconomic Impacts	Response operations may cause major impacts to ports in Albany and throughout river for at least several days. 157 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and real estate would be affected by oil, including residue and odor. SCAT operations and cleanup would be focused on areas more heavily oiled (about 150 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Athens to Lloyd, and on the east shore from Hudson to Poughkeepsie. Additional impacts may be experienced in other towns along the river. Water intakes that may be affected include: Ulster Mile 96; Rondout Mile 92; Rhinebeck Mile 92; Port Ewen Mile 89; Hyde Park Mile 80; Poughkeepsie Mile 77; Highland Mile 76; IBM Mile 72. Additional precautionary fishing advisories would likely be instituted for much or all of the river.											

Kingston 150,000-bbl Diluted Bitumen Spill (Winter-High Tide) Effects

3		Dilutet						
]	Response Equipmen	t and Plan Activati	on		
	NCP and		Tier	Response Requirem	nents	GI	RPs/ GRS (7 d	Ss Activated ays)
	USCG Type	Tier 1 (24	hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail I	Miles	River Miles
	Major WCD	25,000 ft boo 1,000 ft + 30 skimming sy 1,875 bbl/da 3,750 bbl sto	0 per stem y	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n/a		35 river miles Mile 115-75 2016-28 to 2016-58
		•		se Overview: Expect		Challenges	5	1
	Protective	Booming	Me	chanical Recovery	Shoreline Cle	anup	Oth	er Challenges
Spill Response ¹³	An average cur velocity of 1 kt high currents w boom effective containment an diversionary bo configurations to prevent entra splash over; ex deflection conf be used to prote areas. Potential conditions may boom deploym	results in v reducing ness, d oom to be angled ainment and clusion and igurations to ect sensitive ice v affect	veloc skim evap sprea amou recov mobi propu up sh boom truck Poten may	age 1 kt current cities may affect mer operations, 28% oration and rapid ading will reduce unt that can be vered mechanically; ilize floating self- elled skimmers; set noreline containment n areas with vacuum- ts and skimmers. ntial ice conditions affect skimmer ations.	flushing; some su removal due to penetration on sa beaches; oiled do structures; oiled o removal.	ine. wetland ıbstrate ndy ock	oil in hi areas es diluents wetland challeng wetland may cau potentia entrainr column to water kill con- near spi dilution column bottom determi submerg bottom	al for submerged igh-sediment pecially as the s evaporate; l access may be ge; disturbance of ls during response use effects; al for 1% ment in water which may lead r intake and fish cerns in areas ill site prior to t; perform water tracking, perform drags to ne extent of ged oil on river however at 1%, t be detectable.

Kingston 150,000-bbl Diluted Bitumen Spill (Winter-High Tide) Response

¹³ Non-floating oil, therefore OSROs are required to be certified having capabilities as follows: detection; recovery; storage; and optional containment for submerged oil.

⁶⁶ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

	-											
G	Loca		Se	ource	V	olume		Oil Ty	pe	Season		Tide Stage
Scenario Description	Propo Kings Ancho	ston	ATB	collision	150),000 bbl	Di	luted B	itumen	Winter		Low
Spill		Annua	l Proba	bility Any	where	in Hudson I	River	r				ual Frequency 2015)
Probability	Spi	ll of Type	(Any V	olume)	S	pill of Type	and	Volum	ie	US		Hudson
		0.73	32			0.000	001	5		0		0
Conditions	Lat/			ase Rate	Da	Release te/Time		Model l Durati		Winds		Water Temperature
Conditions	41. -73.9	.93017 5700		00 bbl/hr er 4 hrs		nuary 2016 9:00am		30 da	ys	Light / varia (<5 kts)	ble	32°F
				Mass Ba	lance a	nt End of M	odel	Run (A	After 30	Days)		
	Fate	Surfa	ace	Atmospl	nere	Water Column		Sed	liment	Ashore	!	Degraded
	%	57.8	%	28.1%	b	1.6%		0).4%	7.6%		4.6%
SIMAP	bbl	86,6	49	42,12	2,365	540	11,429		6,901			
Modeling Results			Spatial	Extent of l	Exposi	ire over Thi	esho	old (Up	to 30 D	ays After Spil	ll)	
	Water	r (Volume) – Ecol	ogical	Sur	face (Area x	Day	ys Expo	osed)	Shore	line	(Length)
		Whole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 g/m²)Socioeconomic (0.01 g/m²)Ecological (100 g/m²)Socioeconomic (100 g/m²)Socioeconomic (100 g/m²)Socioeconomic (1 g/m²)										
	70,968	70,968 mil gal 103,822 mil gal 182 mi2-days 182 mi2-days 147 mi 153 mi										
			Shorel	ine Exposu	re by S	Shore Type	(Mil	es over	Ecologi	cal Threshold	I)	
	Be	drock	ι	Jnconsolida Rock	ated	Sand 1	Beac	h	Mud	or Timber	A	Artificial Shore
	22	2.6 mi		95.7 mi		1.4	mi		1	2.5 mi		0 mi
Easlagiasl		Brack	kish/Est	uarine We	tland I	Habitats Exp	pose	d (Mile	es over H	cological Thr	esho	old)
Ecological Shoreline Exposures	Salt	tmarsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites /etland		nrub/Scrub and prested Wetland
Exposures	0) mi		0 mi		0 1	ni			0 mi		0 mi
		F								gical Thresho		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites /etland		nrub/Scrub and prested Wetland
	1.	.9 mi		10 mi		2.2	mi			0 mi		0.3 mi
										nse Operation		
Socioeconomic Impacts	153 miles beaches, j would be commerci Newburg towns alo Mile 92; J Danskam	s of shoreli parks, and focused o ial propert h, and on t ong the rive Port Ewen mer Mile (ne woul real esta n areas 1 y, and s he east er. Wate Mile 89 56; Chel	d be oiled a ate would b nore heavil horefront re shore from r intakes th 9; Hyde Par	above t e affec y oiled cal esta Germa at may k Mile 5; Rose	he level of co ted by oil, in (about 147 f te would be f ntown to Be be affected i 80; Poughke ton Mile 65.	once clud miles nost acon nclu æpsi	rn for s ing resi s). Rive affecte . Additi de: Uls e Mile	ocioecon due and erside par ed on the ional imp ter Mile 77; High	odor. SCAT o ks, marinas, b west shore fro bacts may be e	shore perate each om Sa xper Aile	efront marinas, tions and cleanup es, industry, augerties to ienced in other 92; Rhinebeck Mile 72;

Kingston 150,000-bbl Diluted Bitumen Spill (Winter-Low Tide) Effects

Ringston		Response Equipment and Plan Activation									
			R	esponse Equipment	and Plan Activatio	n					
	NCP and		Tier	Response Requiren	nents	G		Ss Activated ays)			
	USCG Type	Tier 1 (24	hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles			
	Major WCD	25,000 ft bc 1,000 ft + 3 skimming s 1,875 bbl/d 3,750 bbl st	00 per ystem ay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n	ı/a	38 river miles Mile 103-65 2016-38 to 2016-65			
		Re	Response Overview: Expected Outcomes a			hallenges	5				
	Protective B	ooming	Mec	hanical Recovery	Shoreline Clea	nup	Othe	er Challenges			
Spill Response ¹⁴	An average currer velocity of 1 kt r high currents war boom effectivened containment and diversionary boo configurations to to prevent entrain splash over; excl deflection config be used to protect areas. Potential i conditions may a boom deployment	esults in reducing ess, on be angled nment and usion and surations to ot sensitive ce uffect	veloci skimm evapor spread amour recove mobili propel up sho boom trucks Potent	ge 1 kt current ties may affect her operations, 28% ration and rapid ling will reduce ht that can be ered mechanically; ize floating self- lled skimmers; set oreline containment areas with vacuum- and skimmers. tial ice conditions ffect skimmer ions.	Approximately 6% impact on shorelin Perform SCAT; w flushing; some sub removal due to penetration on san beaches; oiled doc structures; oiled doc removal.	ee. etland ostrate dy k	oil in hig especial evaporat access n disturba during ro cause ef for 1% e water co lead to v fish kill near spil dilution; column bottom c determin submerg bottom h	l for submerged gh-sediment areas ly as the diluents te; wetland hay be challenge; nce of wetlands esponse may fects; potential entrainment in dumn which may vater intake and concerns in areas l site prior to perform water tracking, perform drags to he extent of ted oil on river nowever at <2%, be detectable.			

Kingston 150,000-bbl Diluted Bitumen Spill (Winter-Low Tide) Response

¹⁴ Non-floating oil, therefore OSROs are required to be certified having capabilities as follows: detection; recovery; storage; and optional containment for submerged oil.

⁶⁸ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

Rondout 75,421-bbl Bakken Crude Spill (ACP Scenario)

Rondout 75,421-bbl Bakken Crude Spill (Spring-High Tide) Effects

	Loca			ource	<u> </u>	/olume	9	Oil Ty		Season		Tide Stage
Scenario Description	Off Ro Cre		Tank b	oarge spill	75	,421 bbl	В	akken o	crude	Spring		High
Smill		Annu	ial Prob	ability Any	where	e in Hudson	Rive	r				ual Frequency 2015)
Spill Probability	Spi	ill of Typ	e (Any '	Volume)	S	pill of Type	and	Volum	e	US		Hudson
		0.7	732			0.0)12			0		0
Conditions	Lat/		Relea	ase Rate	Da	Release ate/Time		Model 1 Durati		Winds		Water Temperature
Conditions	41.9 -73.9	1833 6333	Insta	ntaneous		pril 2016 3:00am		30 da	ys	South / moder (2-15 kts)	ate	48°F
				Mass B	alance	at End of M	lode	l Run (After 3) Days)		
	Fate	Surf	ace	Atmospl	nere	Water Column	1	Se	diment	Ashore	e	Degraded
	%	0.0	%	47.5%	6	19.1%		(0.3%	2.9%		8.3%
SIMAP Modeling	bbl	2		35,79	1	14,416 243				2,187		6,226
Results			Spatia	al Extent of	Expo	sure over Th	resh	old (U	p to 30 l	Days After Spi	ll)	
		r (Volum	e) – Eco	ological	Sur	face (Area x	: Day	s Expo	osed)	Shore	eline	(Length)
												Socioeconomic
		(1 mg/l) (0.001 mg/l) (10 g/m ²) (0.01 g/m ²) (100 g/m ²) (1 g/m ²) 479,385 mil gal 391,035 mil gal 31 mi ² -days 32 mi ² -days 87 mi 123 mi									(1 g/m ⁻) 123 mi	
	+79,305	iiii gai				•				gical Threshol	d)	125 III
	Be	drock		Unconsolida	-	Sand				or Timber		rtificial Shore
	15	5.9 mi		Rock 58.4 mi		01	mi			5.2 mi		0 mi
	10		ckish/E		etland	-		ed (Mil		Ecological Th	resho	-
Ecological Shoreline	C al4			pper Inter		Lower In	_			ragmites		rub/Scrub and
Exposures	Sall	tmarsh		Mix		М			V	Vetland	Fo	rested Wetland
	() mi		0.1 mi		0 1				0.2 mi		0 mi
						-				logical Thresh		
	Catta	il Marsh		Jpper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		rub/Scrub and rested Wetland
	0 mi 5.8 mi 1.7 mi 0 mi 0.3 mi											
	Potential Socioeconomic Impacts from Spill and Response Operations											
	Response operations may cause major impacts to ports in Albany and throughout river for at least several days; evacuations and precautionary clearance zones might cause further impacts to vessel traffic. Evacuation of											
												cuation of I be oiled above
										parks, and real		
Socioeconomic										uld be focused		
Impacts												, and shorefront
										all, and on the		
		Rhinebeck to Philipstown. Additional impacts may be experienced in other towns along the river. Water intakes that may be affected include: Rondout Mile 92; Rhinebeck Mile 92; Port Ewen Mile 89; Hyde Park Mile 80;										
										56; Chelsea Mi		
										much or all of		

	,					- / -						
		NCP and Tier Response Requirements										
	NCP and		Tier	Response Requiren	nents	G	RPs/ GRS (7 d	s Activated ays)				
	USCG Type	Tier 1 (24 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles				
	Major MMPD-WCD	25,000 ft 1,000 ft + skimming 1,875 bbl 3,750 bbl	300 per system /day	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	1	n/a	30 river miles Mile 90-60 2016-47 to 2016-69				
]	Response Overview: Expected Outcomes and				s					
	Protective Bo	oming	Mech	anical Recovery	Shoreline Clear	nup	Othe	r Challenges				
Spill Response	Average river cu 1 kt will reduce l effectiveness, containment and diversionary boo configurations to angled to preven entrainment and over; exclusion a deflection config to be used to pro sensitive areas.	boom m b be t splash und gurations	rapid sp reduce a recovere mobilize propelle up shore boom a	aporation and reading will amount that can be ed mechanically; e floating self- ed skimmers; set eline containment reas with vacuum- nd skimmers.	About 3% is anticip to cause shoreline contamination. Perf SCAT; wetland flux some substrate rem due to penetration of sandy beaches; oile structures; oiled del removal.	form shing; oval on ed dock	Bakken s significat high ben area arou Potential oil in hig areas; we be challe of wetlar response effects; p entrainm water col water int concerns	nt danger, as are zene vapors in ind the spill. for submerged h-sediment etland access may nge; disturbance ids during may cause iotential for ent of 19% in lumn leading to ake and fish kill ; perform water				
							column t monitori	racking, and air ng.				

Rondout 75,421-bbl Bakken Crude Spill (Spring-High Tide) Response

Scenario	Loca	tion	So	ource	Ī	olume		Oil Ty	ре	Season		Tide Stage
Description	Off Ro Cre		Tank b	oarge spill	75	,421 bbl	В	akken c	rude	Spring		Low
Smill		Annı	ial Prob	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)
Spill Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and `	Volume		US		Hudson
_		0.7	732			0.0)12			0		0
Conditions	Lat/I		Relea	ase Rate	Da	Release nte/Time		Model R Duratio		Winds		Water Temperature
	41.9 -73.90	1833 5333	Insta	ntaneous		pril 2016 3:00am		30 day	·	South / mode (2-15 kts)		48°F
				Mass B	alance	at End of M	lode	Run (A	After 30	Days)		T
	Fate	Surf	ace	Atmospl	here	Water Column	I	Sed	iment	Ashore	è	Degraded
	%	0.0	%	38.6%	6	24.1%		0	.3%	2.4%		11.3%
SIMAP Modeling	bbl	0)	29,096 18,178 21					211	1,819		8,551
Results			Spatia	al Extent of	Expo	sure over Th	resh	old (Up	o to 30 D	ays After Spi	ll)	
		Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length) Whele O'll Disclosed Surface (Area x Days Exposed) Surface (Length)										
		Whole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 g/m²)Socioeconomic (0.01 g/m²)Ecological (100 g/m²)Socioeconomic (1 g/m²)										Socioeconomic (1 g/m^2)
	536,573			33 mil gal		mi ² -days		(0.01 g/ 21 mi ² -d		82 mi	,	116 mi
									-	ical Threshold	d)	
	Be	drock	τ	Unconsolida Rock	ated	Sand	Beac	h	Mud	or Timber	Α	rtificial Shore
	14	.5 mi		53.6 mi		0.1	mi		5	.9 mi		0 mi
Ecological		Bra	ckish/E	stuarine W	etland		_			cological Th		
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		rub/Scrub and rested Wetland
Linposures	0.	1 mi		0 mi		0 1	mi			0 mi		0 mi
										gical Thresh		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		rub/Scrub and rested Wetland
	0.1 mi5.9 mi1.6 mi0 mi0.2 mi											
	Potential Socioeconomic Impacts from Spill and Response Operations											
	Response operations may cause major impacts to ports in Albany and throughout river for at least several days;											
	evacuations and precautionary clearance zones might cause further impacts to vessel traffic. Evacuation of populated areas could cause effects on communities and businesses. 116 miles of shoreline would be oiled above											
										arks, and real		
Socioeconomic										ld be focused		
Impacts	heavily o	oiled (abo	ut 82 mi	iles). Rivers	ide pai	ks, marinas,	beac	hes, ind	ustry, co	mmercial prop	perty,	and shorefront
	real estate would be most affected on the west shore from Kingston to Cornwall, and on the east shore from Rhinebeck to Philipstown. Additional impacts may be experienced in other towns along the river. Water intakes											
										wns along the 1 Mile 89; Hyd		
												; Roseton Mile
										nuch or all of		

Rondout 75,421-bbl Bakken Crude Spill (Spring-Low Tide) Effects

nondout /			1	Response Equipmen	t and Plan Activati	0 n	· · · ·	
	NCP and			Response Requiren				Ss Activated ays)
	USCG Type	Tier 1 (2	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major MMPD- WCD	25,000 ft b 1,000 ft + 1 skimming 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n	/a	30 river miles Mile 90-60 2016-47 to 2016-69
]	Respons	e Overview: Expect		Challenge	s	
	Protective B	looming	Mec	hanical Recovery	Shoreline Clea	anup	Oth	er Challenges
Spill Response	Average river of 1 kt will reduce effectiveness, containment an diversionary bo configurations angled to preve entrainment and over; exclusion deflection conf to be used to pr sensitive areas.	d oom to be ent d splash and igurations rotect	39% e rapid s reduce recove mobili propel up sho boom	vaporation and spreading will a amount that can be red mechanically; ze floating self- led skimmers; set reline containment areas with vacuum- and skimmers.	About <3% is anti to cause shoreline contamination. Pe SCAT; wetland flu some substrate ren due to penetration sandy beaches; oil structures; oiled de removal.	cipated rform ushing; noval on ed dock	Flamma Bakken significa high ber area aro Potentia oil in hig areas; w be chall of wetla response effects; entrainn water co water in concern	bility during a spill is a unt danger, as are nzene vapors in und the spill. I for submerged gh-sediment etland access may enge; disturbance nds during e may cause potential for nent of 24% in olumn leading to take and fish kill s; perform water tracking, and air

Rondout 75,421-bbl Bakken Crude Spill (Spring-Low Tide) Response

Scenario	Loca	tion	Se	ource		olume		Oil Ty	pe	Season		Tide Stage	
Description	Off Ro Cre		Tank b	oarge spill	75	5,421 bbl	В	akken o	crude	Summer		High	
Spill		Annı	ial Prob	ability Any	ywher	e in Hudson	Rive	r				ual Frequency 2015)	
Probability	Spi	ill of Typ	e (Any '	Volume)	S	pill of Type	and `	Volum	e	US		Hudson	
_		0.7	732			0.0)12			0		0	
Conditions	Lat/		Relea	ase Rate	Da	Release ate/Time		Model 1 Durati		Winds		Water Temperature	
	41.9 -73.9	1833 6333	Insta	ntaneous		ugust 2016 D:00am		30 da	ys	Light / varia (<5 kts)	ble	75°F	
				Mass B	alance	at End of M	lode	l Run (After 30	Days)			
	Fate	Surf	ace	Atmospl	here	Water Column	l	See	diment	Ashore	e	Degraded	
	%	0.1	%	52.8%	37.3%		().1%	6.6%		3.1%		
SIMAP Modeling	bbl	10	19	39,78	7	28,165			90	4,942		2,327	
Results			Spatia	al Extent of	sure over Th	resh	old (U	p to 30 D	ays After Spi	ll)			
	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length) Whole Oil Dissolved Ecological Socioeconomic Ecological Socioecon										-		
	Who (1 n	le Oil ng/l)		ssolved 01 mg/l)		cological 10 g/m ²)		ocioeco (0.01 g		Ecological (100 g/m ²)		Socioeconomic (1 g/m ²)	
	170,510	mil gal	72,84	$\frac{(10 \text{ g/m})}{(228 \text{ m}^2-\text{days})} = \frac{(10 \text{ g/m})}{(10 \text{ g/m})}$					days	89 mi 108 mi			
				-		Shore Type	e (Mi	les ove	r Ecolog	ical Threshold	d)		
	Be	drock	τ	Unconsolida Rock	ated	Sand 1	Beac	h	Mud	or Timber	A	rtificial Shore	
	15	.6 mi		39.7 mi		2.2	2 mi			5.2 mi		0 mi	
Ecological		Bra					-			Cological Th			
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		rub/Scrub and rested Wetland	
Liposuros	() mi		0 mi		0 1	ni			0 mi		0 mi	
										ogical Thresh			
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		rub/Scrub and rested Wetland	
	2.	.9 mi		11.5 mi		1.7				0.2 mi	10	0.3 mi	
			Poten	tial Socioed	conom	ic Impacts fi	com (Spill aı	nd Respo	nse Operatio	ns		
	-	-	ons may	cause major	r impa	cts to ports in	Alb	any and	l through	out river for at	leas	t several days;	
										vessel traffic.			
										arks, and real		l be oiled above	
Socioeconomic										ild be focused			
Impacts	heavily of	oiled (abo	ut 89 mi	iles). Rivers	side par	rks, marinas,	beac	hes, inc	lustry, co	mmercial prop	perty,	and shorefront	
												from Hudson to	
												kes that may be e Park Mile 80;	
												ries would likely	
				all of the riv						, , ,			

Rondout 75,421-bbl Bakken Crude Spill (Summer-High Tide) Effects

nonaoat /	,				0	,			
]	Response Equipmen	t and Plan Activati				
	NCP and		Tier	Response Requiren	nents	G		Ss Activated ays)	
	USCG Type	Tier 1 (2	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles	
	Major MMPD- WCD	25,000 ft b 1,000 ft + 1 skimming 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n	/a	38 river miles Mile 113-75 2016-30 to 2016-58	
]	Respons	e Overview: Expect	Challenge	s			
	Protective B	looming	Mec	hanical Recovery	Shoreline Clea	anup	Other Challenges		
Spill Response	Average river of 1 kt will reduce effectiveness, containment an diversionary bo configurations angled to preve entrainment and over; exclusion deflection confi to be used to pr sensitive areas.	currents of e boom d boom to be ent d splash and igurations rotect	rapid s reduce recove mobili propel up sho boom	vaporation and spreading will a amount that can be red mechanically; ze floating self- led skimmers; set reline containment areas with vacuum- and skimmers.	About <7% is anti to cause shoreline contamination. Pe SCAT; wetland flu some substrate ren due to penetration sandy beaches; oil structures; oiled de removal.	rform ushing; noval on led dock	Flamma Bakken significa high ber area aro Potentia oil in hig areas; w be chall of wetla response effects; entrainn water co water in concern	bility during a spill is a unt danger, as are nzene vapors in und the spill. I for submerged gh-sediment etland access may enge; disturbance nds during e may cause potential for nent of 37% in blumn leading to take and fish kill s; perform water tracking, and air	

Rondout 75,421-bbl Bakken Crude Spill (Summer-High Tide) Response

Scenario	Loca	tion	Se	ource	Ī	olume		Oil Ty	ре	Season		Tide Stage	
Description	Off Ro Cre		Tank b	oarge spill	75	,421 bbl	Ва	akken c	rude	Summer		Low	
Spill		Annı	ial Prob	ability Any	ywhere	e in Hudson	Rive	r				ual Frequency 2015)	
Probability	Spi	ill of Typ	e (Any '	Volume)	S	pill of Type	and V	Volum	e	US		Hudson	
_		0.7	732			0.0)12			0		0	
Conditions	Lat/		Relea	ase Rate	Da	Release ate/Time		Aodel I Durati		Winds		Water Temperature	
	41.91 -73.9		Insta	ntaneous		ugust 2016 0:00am		30 day	ys	Light / varial (<5 kts)	ble	75°F	
				Mass B	alance	at End of N	Iodel	Run (After 30	Days)		I	
	Fate	Surf	ace	Atmospl	here	Water Column	l	Sec	liment	Ashore	è	Degraded	
	%	0.1	%	52.79	%	37.4%		C	0.1%	6.5%		3.2%	
SIMAP Modeling	bbl	6:	5	39,74	8	28,239			55	4,922		2,392	
Results			Spatia	al Extent of	f Expo	sure over Th	resh	old (Uj	p to 30 D	ays After Spi	ll)		
	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)										=		
	Who (1 n	le Oil 1g/l)		ssolved 01 mg/l)		cological 10 g/m ²)		cioeco (0.01 g		Ecological (100 g/m ²)		Socioeconomic (1 g/m ²)	
	173,294	mil gal	75,44	6 mil gal	224	mi ² -days	22	24 mi ² -	days	95 mi 117 mi			
					-	Shore Type	e (Mi	les ove	r Ecologi	ical Threshold	d)		
	Be	drock	ι	Unconsolida Rock	ated	Sand	Beacl	h	Mud	or Timber	A	rtificial Shore	
	1	5 mi		42.2 mi					1	8.8 mi		0 mi	
Ecological		Bra					-			Cological Th			
Shoreline Exposures	Salt	marsh		pper Inter Mix	tidal	Lower In M		idal		agmites etland		rub/Scrub and rested Wetland	
Laposures	() mi		0 mi		0 1	ni			0 mi		0 mi	
										gical Thresh			
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		rub/Scrub and rested Wetland	
	3.	1 mi		11.8 mi		2 1	ni		C	0.2 mi		0.3 mi	
			Poten	tial Socioe	conom	ic Impacts fi	com S	Spill ar	nd Respo	nse Operatio	ns		
	~	-	-	-	-	-		-	-			t several days;	
										vessel traffic.		uation of t be oiled above	
										arks, and real			
Socioeconomic										Ild be focused			
Impacts												, and shorefront	
												from Stockport	
												takes that may yde Park Mile	
												visories would	
	likely be	institute	d for mu	ch or all of	the riv	er.							

Rondout 75,421-bbl Bakken Crude Spill (Summer-Low Tide) Effects

nonaoat /	•, ·= · •• · · ·			(30)				
			R	esponse Equipment	and Plan Activatio	n		
	NCP and		Tier	Response Requiren	nents	G	RPs/ GRS (7 d	Ss Activated ays)
	USCG Type	Tier 1 (2	24 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major MMPD-WCD	25,000 ft 1,000 ft + skimming 1,875 bbl 3,750 bbl	300 per system /day	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	1	ı/a	45 river miles Mile 120-75 2016-25 to 2016-58
]	Response		ed Outcomes and Cl	nallenge	s	
	Protective Bo	oming	Mech	anical Recovery	Shoreline Clear	ոսք	Othe	er Challenges
Spill Response	Average river cu 1 kt will reduce l effectiveness, containment and diversionary boo configurations to angled to preven entrainment and over; exclusion a deflection config to be used to pro sensitive areas.	boom be t splash und gurations	rapid sp reduce a recovered mobilize propelle up shore boom a	aporation and reading will amount that can be ed mechanically; e floating self- ed skimmers; set eline containment reas with vacuum- nd skimmers.	About <7% is antic to cause shoreline contamination. Perf SCAT; wetland flus some substrate reme due to penetration of sandy beaches; oile structures; oiled det removal.	Form shing; oval on d dock	Bakken s significat high ben area arou Potential oil in hig areas; we be challe of wetlar response effects; p entrainm water col water int concerns	nt danger, as are zene vapors in ind the spill. for submerged h-sediment etland access may nge; disturbance nds during may cause potential for ent of 37% in lumn leading to ake and fish kill ; perform water racking, and air

Rondout 75,421-bbl Bakken Crude Spill (Summer-Low Tide) Response

Scenario	Loca	tion	Se	ource	I	/olume		Oil Ty	ре	Season		Tide Stage
Description	Off Ro Cre		Tank b	oarge spill	75	,421 bbl	В	akken c	rude	Winter		High
Spill		Annu	ial Prob	ability Any	where	e in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	S	pill of Type	and `	Volume	e	US		Hudson
		0.7	732			0.0	012			0		0
Conditions	Lat/		Relea	ase Rate	Da	Release ate/Time		Aodel F Durati		Winds		Water Temperature
	41. -73.9	.91833 6333	Insta	ntaneous		ugust 2016 6:30am		30 day		Light / variat (<5 kts)	ole	75°F
				Mass B	alance	at End of M	lode	Run (A	After 30	Days)		1
	Fate	Surf	face	Atmosph		Water Column	l		liment	Ashore	-	Degraded
CIDAAD	%	21.		51.1%		10.6%			0.1%	14.1%		2.5%
SIMAP Modeling	bbl	16,3								10,661		1,865
Results		Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill)										
	Water (Volume) – Ecological Surface (Area x Days Exposed) Shoreline (Length) Whele Oil Disselved Ecological Sociecementia										-	
	Whole Oil (1 mg/l) Dissolved (0.001 mg/l) Ecological (10 g/m ²) Socioeconomic (0.01 g/m ²) Ecological (100 g/m ²) Socioeconomic (100 g/m ²)										Socioeconomic (1 g/m ²)	
	129,155			$30 \text{ mil gal} \qquad 336 \text{ mi}^2\text{-days} \qquad 353 \text{ mi}^2\text{-days}$								
			Shore	eline Expos	ure by	Shore Type	e (Mi	les ovei	r Ecolog	gical Threshol	d)	
	Be	drock	I	Unconsolida Rock	ated	Sand	Beac	h	Mud	or Timber	A	rtificial Shore
	19	.9 mi		83 mi		0.6	mi			10 mi		0 mi
Ecological		Bra					-			Ecological Th		
Shoreline	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		rub/Scrub and rested Wetland
Exposures	() mi		0 mi		0 1				0.3 mi		0 mi
			Freshw	ater Wetla	nd Ha	bitats Expos	ed (N	Ailes ov	ver Ecol	ogical Thresh	old)	
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		rub/Scrub and rested Wetland
	1	mi		7.3 mi		2 1	ni			0 mi		0.3 mi
										onse Operatio		
Socioeconomic Impacts	evacuatie populate the level affected heavily of real estat Rhineber may be a Mile 80;	ons and p d areas co of conce by oil, in biled (abc te would ck to Bea affected in Poughke	recautio ould cau rn for so cluding r out 124 n be most con. Ado nclude: U cepsie M	nary clearar se effects on cioeconomi residue and niles). River affected on ditional imp Jlster Mile 9 ile 77; High	nce zorn n comm c effec odor. S rside pa the we acts m 96; Ro land M	nes might cau nunities and l ets; shorefron SCAT operat arks, marinas est shore from ay be experie ndout Mile 9 file 76; IBM	se fu busin t man ions a , bea n Ulst enced 2; Rh Mile	rther im lesses. 1 inas, be and clea ches, in ter to N l in othe ninebeck 72; Dat	npacts to 139 mile eaches, p anup wo dustry, o ewburgh er towns k Mile 9 nskamm	vessel traffic. s of shoreline v parks, and real uld be focused commercial pro n, and on the ea along the river	Evac would estate on a opert ast sh r. Wa viile {	d be oiled above e would be reas more y, and shorefront ore from ter intakes that 39; Hyde Park a Mile 66;

Rondout 75,421-bbl Bakken Crude Spill (Winter-High Tide) Effects

nonaoat /	0,421 001 E				lei-ingii nuc		spons	
			R	esponse Equipment	and Plan Activatio	n		
	NCP and		Tier	Response Requirer	nents	G		Ss Activated ays)
	USCG Type	Tier 1 (24 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major MMPD-WCD	25,000 ft 1,000 ft + skimming 1,875 bbl 3,750 bbl	- 300 per g system /day	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	1	n/a	28 river miles Mile 93-65 2016-45 to 2016-65
]	Response	Overview: Expecte	ed Outcomes and Cl	nallenge	s	
	Protective Bo	oming	Mech	anical Recovery	Shoreline Clear	nup	Othe	er Challenges
Spill Response	Average river cu 1 kt will reduce l effectiveness, containment and diversionary boo configurations to angled to preven entrainment and over; exclusion a deflection config to be used to pro sensitive areas. F ice conditions m boom deployment	boom be t splash und yurations tect Potential ay affect	rapid sp reduce a recover mobiliz propelle up shor boom a trucks a potentia	aporation and preading will amount that can be ed mechanically; e floating self- ed skimmers; set eline containment reas with vacuum- nd skimmers; l ice conditions fect skimmer ons.	About 14% is antic to cause shoreline contamination. Perf SCAT; wetland flux some substrate rem due to penetration of sandy beaches; oile structures; oiled del removal.	form shing; oval on ed dock	Bakken s significa high ben area arou Potential oil in hig areas; we be challe of wetlar response effects; p entrainm water co water int concerns areas nea to dilutio	nt danger, as are zene vapors in and the spill. for submerged th-sediment etland access may onge; disturbance ods during may cause botential for ent of 11% in lumn leading to ake and fish kill especially in ar the spill prior on; perform water racking, and air

Rondout 75,421-bbl Bakken Crude Spill (Winter-High Tide) Response

Scenario	Loca	tion	Se	ource	1	olume		Oil Ty	pe	Season		Tide Stage	
Description	Off Ro Cre		Tank b	oarge spill	75	,421 bbl	В	akken o	crude	Winter		Low	
Spill		Annu	ial Prob	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)	
Probability	Spi	ill of Typ	e (Any '	Volume)	S	pill of Type	and `	Volum	e	US		Hudson	
		0.7	732			0.0)12			0		0	
Conditions	Lat/		Relea	ase Rate	Da	Release nte/Time		Model 1 Durati		Winds		Water Temperature	
Conditions	41.91 -73.9		Insta	ntaneous		nuary 2016 9:00am		30 da	ys	Light / variab (<5 kts)	ole	32°F	
				Mass B	alance	at End of N	lode	Run (After 30	Days)		1	
	Fate	Surf	ace	Atmospl	here	Water Column	l	Se	diment	Ashore	e	Degraded	
	%	21.2	2%	51.1% 10.8				(0.1%	14.3%		2.5%	
SIMAP Modeling	bbl	15,9	969	38,55	2	8,166			58	10,802	2	1,874	
Results			Spatia	al Extent of	Expo	sure over Th	resh	old (U	p to 30 I	Days After Spi	ll)		
	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)										-		
		le Oil		ssolved		cological		cioeco		Ecological		Socioeconomic $(1 - a/m^2)$	
	(1 n 123,916	\mathbf{u}		(0.001 mg/l) (10 g/m ²) (0.0 6,162 mil gal 333 mi ² -days 349 m									
	125,910	iiii gui		162 mil gal333 mi²-days349 mi²-daysoreline Exposure by Shore Type (Miles over Ec							d)	157 111	
	Be	drock		Unconsolida Rock	•	Sand	-			or Timber		rtificial Shore	
	19	.9 mi		82 mi		1.1	mi		1	0.2 mi		0 mi	
		Bra	ckish/E	stuarine W	etland	Habitats Ex	xpose	ed (Mil	es over l	Ecological Th	resho	old)	
Ecological Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites /etland		rub/Scrub and rested Wetland	
Exposures	() mi		0 mi		0 1	mi			0 mi		0 mi	
			Freshw	ater Wetla	nd Ha	bitats Expos	ed (N	Miles o	ver Ecol	ogical Thresh	old)		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites /etland		rub/Scrub and rested Wetland	
	1	mi		7.6 mi		1.9	mi			0 mi		0.3 mi	
										onse Operatio			
	-			5				2	0	out river for at		. .	
	evacuations and precautionary clearance zones might cause further impacts to vessel traffic. Evacuation of populated areas could cause effects on communities and businesses. 137 miles of shoreline would be oiled above												
										arks, and real			
Socioeconomic									-	uld be focused			
Impacts												y, and shorefront	
										and on the eas			
												ater intakes that	
										2; Port Ewen M er Mile 66; Ch			
										th or all of the			

Rondout 75,421-bbl Bakken Crude Spill (Winter-Low Tide) Effects

nonaout /	0,421 001 E	Jannen					ponse	
			R	esponse Equipment	and Plan Activatio	n		
	NCP and		Tier	Response Requirer	nents	G		s Activated ays)
	USCG Type	Tier 1 (24 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major MMPD-WCD	25,000 ft 1,000 ft + skimming 1,875 bbl 3,750 bbl	- 300 per g system /day	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	1	n/a	25 river miles Mile 95-70 2016-44 to 2016-62
]	Response	Overview: Expected	ed Outcomes and Cl	hallenge	s	
	Protective Bo	oming	Mech	anical Recovery	Shoreline Clear	nup	Othe	er Challenges
Spill Response	Average river cu 1 kt will reduce l effectiveness, containment and diversionary box configurations to angled to preven entrainment and over; exclusion a deflection config to be used to pro sensitive areas. H ice conditions m boom deployment	boom on be t splash and gurations tect Potential ay affect	rapid sp reduce a recovery mobiliz propelle up shore boom au trucks a potentia	aporation and preading will amount that can be ed mechanically; e floating self- ed skimmers; set eline containment reas with vacuum- nd skimmers; l ice conditions fect skimmer ons.	About 14% is antic to cause shoreline contamination. Perf SCAT; wetland flux some substrate rem due to penetration of sandy beaches; oile structures; oiled del removal.	form shing; oval on ed dock	Bakken s significa high ben area arou Potential oil in hig areas; we be challe of wetlar response effects; p entrainm water co water int concerns areas nea prior to c	nt danger, as are zene vapors in and the spill. for submerged h-sediment etland access may nge; disturbance ads during may cause botential for ent of 11% in lumn leading to ake and fish kill especially in ar the spill site lilution; perform lumn tracking,

Rondout 75,421-bbl Bakken Crude Spill (Winter-Low Tide) Response

Scenario	Location	Sour	rce	Volume	Oil T	ype	Seas	on	Tide	
Description	Off Rondout Creek	Tank l spi		75,421 bbl	Bakken oil		Sumr	ner	High	
Spill		Ar	nnual P	robability			Historio	cal Annua (2000-2)	al Frequency 015)	
Spill Probability	Spill of Type	e in Huds	on	Spill Volum	e in Huds	on	US	5	Hudson	
-	0.7	32		0.0	12		0		0	
Conditions	Lat/Lon	Release	Rate	Release Date/Time	Run Du	ration	Win		Temperature	
Conditions	41.91833 -73.96333	Instanta	aneous	7 August 2016 0:00am	30 da	-	Light/va (<5 k	ts)	75°F	
Fire/Explosion	Pool Fire			Pool Fire		Vapor (Cloud Explosion	
Probabilities	Probability/In	cident		Probability	Ex		Incident	P	robability	
	0.08			0.0096		0.02				
	Emergency			Evacuat				alth/Safe	-	
	This event may ha a spill on the wate simultaneously.		ire and	As an immediate measure, isolate s for at least 50 met all directions.	pill or leal	k area eet) in	irritate or bu	rn skin an		
	Specific incident of be made early as t	o whether	to	Large Spill	, .,		Fire may produce irritating, corrosive and/or toxic gases.			
	attack fire or allow	v it to bur	n out.	• Consider initial evacuation for at			Vapors may cause dizziness or suffocation.			
	Port of Albany ha			(1000 feet).						
	firefighting vessel			D:					s will normally	
	a 1,500 gpm wate unit may be insuff			Fire ISOLATE for 8 	00 meters		contain lighter flammable gasses such as butane and propane (unless these			
Fire/Explosion	potential size of the			mile) in all direct		(1/2	gases have been removed). These			
Response ¹⁵				consider initial ev			flammable gasses can readily ignite if			
	Kingston, Albany			meters (1/2 mile)	in all dired	ctions.			ome in contact	
	FD have NYS sup trailers w/monitor								e. These crude hydrogen sulfide,	
	oil derailment fire								ard material. Due	
	and foam quantity	would be	2						of crude oil, in an	
	insufficient for thi	s larger v	essel						behavior of this	
	spill/fire.						product may gasoline for		r (sweet) crude	
	RP would be requ	ired to							he heavier (sour)	
	implement and me						crude oils.			
	Firefighting contr	actor reso	urces				A ::4:		1 h	
	in order to provide foam and equipme						responder an		be performed for	
	a potential large fi		ond to				responder un	la puone :	Julety.	
	Flammable			In	npacts fro	m Fire	(Acres)			
	Distance	To	tal	Residential	Com	mercial	Indus	strial	Public Use	
Safaty Impacts	581 ft	0.8 a	0 acres	0	acres	0.4 :	acre	0.4 acre		
Safety Impacts	Downwind			Impacts from Explosi			losion (Acres)			
	Distance	To	tal	Residential				strial	Public Use	
	2.19 miles	418 a	ores	155 acres	4 acres	50 a	cres	79 acres		

Rondout 75,421-bbl Bakken Crude Spill with Fire/Explosion

¹⁵ If concurrent with a spill to the water, see also spill response tables. If there is a fire and/or explosion, some or even most of the oil may be consumed by the fire, reducing the amount of oil that would spill into the river and affect shorelines. In most cases, it would be necessary to conduct at least some oil spill cleanup in addition to fire-fighting, though those operations would be secondary to emergency fire-fighting operations.

⁸¹ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

Rondout 14,000-bbl Heavy Fuel Oil Spill (ACP Scenario)

Rondout 14,000-bbl Heavy Fuel Oil Spill (Spring-High Tide) Effects

Scenario	Loca	tion	So	ource	V	olume		Oil Ty	pe	Season		Tide Stage
Description	Off Ro Cre		-	o vessel spill	14	,000 bbl	He	eavy Fu	el Oil	Spring		High
Spill		Annu	ial Prob	ability Any	where	e in Hudson	Rive	er				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	S	pill of Type	and `	Volume	e	US		Hudson
		4.0)73			0.0)31			0		0
Conditions	Lat/l		Relea	ase Rate	Da	Release ate/Time		Model I Durati		Winds		Water Temperature
	41.91 -73.90		Insta	ntaneous	-	pril 2016 3:00am		30 day		South / moder (2-15 kts)	ate	48°F
				Mass B	alance	at End of M	lode	l Run (.	After 30	Days)		
	Fate	Surf	ace	Atmosph	nere	Water Column	l	Sec	liment	Ashore	e	Degraded
	%	1.8	%	5.7%)	0.0%		C	0.0%	70.3%		22.2%
SIMAP Modeling	bbl	24	-8	802		0			0	9,836		3,112
Results			Spatia	al Extent of	Expo	sure over Th	resh	old (Uj	p to 30 I	Days After Spi	ll)	
		r (Volum		-		face (Area x						(Length)
	Whol (1 m			ssolved 01 mg/l)	(cological 10 g/m²)		ocioeco (0.01 g	$/m^2$)	Ecological (100 g/m ²)		Socioeconomic (1 g/m ²)
	59 mi	l gal	1,918	3 mil gal	12	mi ² -days	1	12 mi^2 -c	lays	113 mi		125 mi
					-	Shore Type	e (Mi	r Ecolog	gical Threshold			
	Be	drock	ι	Unconsolida Rock	ated	Sand 1	Beac	h	Mud	or Timber	A	Artificial Shore
	18	.7 mi		77.8 mi		0 1	ni			6.8 mi		0 mi
Ecological		Bra					-			Ecological Th		
Shoreline	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		hrub/Scrub and prested Wetland
Exposures	C) mi		0 mi		0 1				0 mi		0 mi
			Freshw	ater Wetla	nd Ha	bitats Expos	ed (N	Miles o	ver Ecol	ogical Thresh	old)	
	Cattai	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		hrub/Scrub and prested Wetland
	0.	4 mi		7 mi		2.1	mi			0 mi		0.3 mi
										onse Operatio		
	-	-	-	-	-	-		-	-	nout river for at		st several days. refront marinas,
	beaches,	parks, ar	d real es	state would	be affe	cted by oil, i	ncluc	ding res	idue and	l odor. SCAT o	pera	tions and cleanup
Socioeconomic										urks, marinas, b		
Impacts												Cingston to New rienced in other
	towns alo	ong the ri	ver. Wa	ter intakes t	hat ma	y be affected	inclu	ude: Ro	ndout M	lile 92; Rhineb	eck I	Mile 92; Port
					•	•		•				le 66; Chelsea for much or all
	of the riv				Freedu		8	- 100110			u	

			F	Response Equipment	t and Plan Activatio	n		
	NCP and		Tier	Response Requiren	nents	G		Ss Activated ays)
	USCG Type	Tier 1 (2	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage]	n/a	29 river miles Mile 92-63 2016-46 to 2016-67
]	Response	e Overview: Expect	ed Outcomes and Cl	hallenge	s	
	Protective E	Booming	Mech	nanical Recovery	Shoreline Clear	nup	Othe	er Challenges
Spill Response	Average river of 1 kt will reduce effectiveness, containment an diversionary bo configurations angled to preve entrainment an over; exclusion deflection confi to be used to prisensitive areas.	e boom d oom to be ent d splash and igurations rotect	the bul contam shoreli amoun recover mobiliz propell designe set up s contain	% evaporation with k of the spill ninating the ne will reduce t that can be red mechanically; ze floating self- ed skimmers ed for heavy oils; shoreline ment boom areas acuum-trucks and ers.	About 70% is antic to cause shoreline contamination and require significant shoreline cleanup o contaminated sedin and debris. Perform SCAT; wetland flux some substrate rem due to penetration o sandy beaches; oile structures; oiled del removal.	will of nent, shing; oval on ed dock	heavy oi significa Potential shoreline wetland challeng wetlands may caus potential of oil in a signific responde	bility during a l spill is not a nt danger, for significant e cleanup, access may be e; disturbance of during response se effects; for entrainment water column not eant factor, rs need to wear le Tyvek

Rondout 14,000-bbl Heavy Fuel Oil Spill (Spring-High Tide) Response

Scenario	Loca		-	ource		/olume		Oil Type	T	Season		Tide Stage
Description	Off Ro Cre			o vessel spill	14	,000 bbl	He	eavy Fuel C	Dil	Spring		Low
Spill		Annu	ial Prob	ability Any	where	e in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	S	pill of Type	and `	Volume		US		Hudson
		4.0)73			0.0)31			0		0
Conditions	Lat/I		Relea	ase Rate	Da	Release ate/Time		Model Run Duration		Winds		Water Temperature
	41.91 -73.90		Insta	ntaneous		pril 2016 1:00am		30 days	Š	South / mode (4-15 kts)		48°F
				Mass B	alance	at End of N	lode	Run (Afte	er 30 I	Days)		
	Fate	Surf	face	Atmosph	nere	Water Column	I	Sedim	ent	Ashore	e	Degraded
	%	1.2	.%	5.7%	1	0.0%		0.0%	b	70.8%		22.2%
SIMAP Modeling	bbl	17	1	802 0 0						9,915		3,112
Results		Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill)										
		Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)										
											Socioeconomic (1 g/m ²)	
	64 mi	l gal	1,272	2 mil gal	11	mi ² -days	1	1 mi ² -days		115 mi		125 mi
				-	·	Shore Type	e (Mi	les over Ec	cologic	al Threshol	d)	
	Be	drock		Unconsolida Rock	ated	Sand 1	Beac	h N	Aud or	r Timber	A	Artificial Shore
	19	.4 mi		78.2 mi		0.1				5 mi		0 mi
Ecological		Bra				Habitats Ex	_					
Shoreline	Salt	marsh	U	Upper Inter Mix	tidal	Lower In M		idal		gmites tland		nrub/Scrub and prested Wetland
Exposures	0.	1 mi		0 mi		01				mi		0 mi
			Freshw	ater Wetla	nd Ha	bitats Expos	ed (N	Miles over	Ecolog	gical Thresh	old)	
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		gmites tland		nrub/Scrub and prested Wetland
	0.	4 mi		7.3 mi		2.2	mi		0	mi		0.3 mi
	Potential Socioeconomic Impacts from Spill and Response Operations											
Socioeconomic Impacts	125 mile beaches, would be commerce Balmvill towns ale Ewen M	s of shor parks, ar focused cial prope e, and on ong the r ile 89; H sea Mile	eline wo nd real es on areas erty, and the east iver. Wa yde Park 66; Rose	uld be oiled state would s more heav shorefront r shore from ter intakes t Mile 80; Pe	above be affe ily oile real est Rhine hat ma oughke	the level of acted by oil, i ed (about 115 ate would be beck to Wap y be affected cepsie Mile 7	conce ncluc mile mos pinge inch 7; Hi	ern for soci ling residue es). Riversio t affected o er. Addition ude: Rondo ghland Mil	oecond e and o de park on the v nal imp out Mil- le 76; I	omic effects; dor. SCAT o as, marinas, b west shore fro acts may be e 92; Rhineb BM Mile 72;	shor opera oeach om K expe eck I ; Dar	t several days. efront marinas, tions and cleanup nes, industry, tingston to rienced in other Mile 92; Port askammer Mile be instituted for

Rondout 14,000-bbl Heavy Fuel Oil Spill (Spring-Low Tide) Effects

			I	Response Equipmen	t and Plan Activation	on		
	NCP and			Response Requiren				Ss Activated ays)
	USCG Type	Tier 1 (24	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n	/a	23 river miles Mile 90-67 2016-47 to 2016-64
		J	Respons	e Overview: Expect	ed Outcomes and C	hallenge	s	
	Protective B	Booming	Mec	hanical Recovery	Shoreline Clea	nup	Oth	er Challenges
Spill Response	Average river of 1 kt will reduce effectiveness, containment an diversionary bo configurations angled to preve entrainment and over; exclusion deflection confi to be used to pri- sensitive areas.	e boom d oom to be ent d splash and igurations	the bul contain shoreli amoun recove mobili propel design set up contain	5% evaporation with lk of the spill ninating the ine will reduce that can be rred mechanically; ze floating self- led skimmers ed for heavy oils; shoreline nment boom areas acuum-trucks and ters.	About 71% is anti- to cause shoreline contamination and require significant shoreline cleanup of contaminated sedia and debris. Perforn SCAT; wetland flu some substrate ren due to penetration sandy beaches; oil structures; oiled do removal.	will of ment, n ishing; noval on ed dock	heavy of significa Potentia shorelin wetland challeng wetlands may cau potentia of oil in a signifi responde	bility during a il spill is not a int danger, l for significant e cleanup, access may be e; disturbance of s during response se effects; l for entrainment water column not cant factor, ers need to wear oble Tyvek s

Rondout 14,000-bbl Heavy Fuel Oil Spill (Spring-Low Tide) Response

Saamania	Loca		_	ource	-	olume		Oil Typ		Season		Tide Stage
Scenario Description	Off Ro Cre			o vessel spill	14	,000 bbl	Не	eavy Fue	el Oil	Summer		High
Spill		Annı	ial Prob	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	S	pill of Type	and	Volume		US		Hudson
		4.0)73			0.0)31			0		0
Conditions	Lat/I		Relea	ase Rate	Da	Release ite/Time		Model R Duratio		Winds		Water Temperature
	41.91 -73.90		Insta	ntaneous		igust 2016):00am		30 days	5	Light / varia (<5 kts)	ble	75°F
				Mass B	alance	at End of M	lode	l Run (A	After 30	Days)		
	Fate	Surf	ace	Atmospl	nere	Water Column	<u>1</u>	Sedi	iment	Ashore	e	Degraded
	%	% 17.1% 6.4% 0.0% 0.0% 54.4% 22										22.2%
SIMAP Modeling	bbl	2,3	95	891		0			2	7,609		3,102
Results		Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill)										
	Water	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)										-
												Socioeconomic (1 g/m ²)
	20 mi	il gal	11,13	1 mil gal	83	mi ² -days	8	33 mi ² -da	ays	71 mi		73 mi
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
	Be	drock	τ	Unconsolida Rock	ated	Sand 1	Beac	h	Mud o	or Timber	A	artificial Shore
	14	.1 mi		32.3 mi		2.2	mi		10).7 mi		0 mi
Ecological		Bra					_			cological Th		
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M	ntert lix	idal		agmites etland		nrub/Scrub and prested Wetland
Liposuros	C) mi		0 mi		0 1	mi			0 mi		0 mi
										gical Thresh		
	Cattai	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		nrub/Scrub and prested Wetland
	2.	2 mi		8.5 mi		0.5	mi			0 mi		0.3 mi
	Potential Socioeconomic Impacts from Spill and Response Operations Response operations may cause major impacts to ports in Albany and throughout river for at least several days. 73											
Socioeconomic Impacts	would be focused on aleas more nearing oned (about 71 miles): Reverside parks, marmas, beaches, mausify,								nt marinas, tions and cleanup s, industry, augerties to ed in other towns inebeck Mile 92;			

Rondout 14,000-bbl Heavy Fuel Oil Spill (Summer-High Tide) Effects

				Response Equipme	nt and Plan Activati	on		
	NCP and		Tier	Response Require	ments	G		Ss Activated ays)
	USCG Type	Tier 1 (24	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major WCD	25,000 ft b 1,000 ft + 1 skimming 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n	/a	25 river miles Mile 103-78 2016-38 to 2016-56
]	Respons	se Overview: Expec	ted Outcomes and O	Challenge	s	
	Protective B	Booming	Mec	hanical Recovery	Shoreline Clea	anup	Oth	er Challenges
Spill Response	Average river of 1 kt will reduce effectiveness, containment an diversionary bo configurations angled to preve entrainment an over; exclusion deflection conf to be used to pr sensitive areas.	e boom d oom to be ent d splash and igurations rotect	the bu contar shorel amoun recove althou to rem surfac self-pp design set up contai	5% evaporation with lk of the spill ninating the ine will reduce nt that can be ered mechanically gh 17% is projected uain floating on e; mobilize floating ropelled skimmers ned for heavy oils; shoreline nment boom areas racuum-trucks and	to cause shoreline contamination and require significant shoreline cleanup contaminated sedi	d will of ment, m ushing; noval on led dock	heavy o significa Potentia shorelin wetland challeng wetland may cau potentia of oil in a signifi respond	bility during a il spill is not a ant danger, l for significant e cleanup, access may be ge; disturbance of s during response use effects; l for entrainment water column not cant factor, ers need to wear ole Tyvek

Rondout 14,000-bbl Heavy Fuel Oil Spill (Summer-High Tide) Response

Scenario	Loca		-	ource		olume		Oil Type		Season		Tide Stage
Description	Off Ro Cre			o vessel spill	14	,000 bbl	He	avy Fuel Oi		Summer		Low
Spill		Annu	ial Prob	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type a	and `	Volume		US		Hudson
-		4.()73			0.0)31			0		0
Conditions	Lat/I		Relea	ase Rate	Da	Release nte/Time		Model Run Duration		Winds		Water Temperature
Conditions	41.91 -73.90		Insta	ntaneous		1gust 2016 5:30am		30 days	ys Light / va (<5 kt			75°F
				Mass B	alance	at End of M	lode	Run (After	30 I	Days)		
	Fate	Surf	ace	Atmospl	nere	Water Column	1	Sedimer	nt	Ashore	e	Degraded
	%	18.2	2%	6.4%		0.0%		0.0%		53.2%		22.2%
SIMAP Modeling	bbl	2,5	53	894		0		2		7,448		3,102
Results		Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill)										
	Water	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)										-
												Socioeconomic (1 g/m ²)
	14 mi	l gal	10,83	0 mil gal	84	mi ² -days	8	34 mi ² -days		69 mi		72 mi
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
	Be	drock	τ	Unconsolida Rock	ated	Sand	Beac	h M	ud o	r Timber	A	Artificial Shore
	12	.9 mi		31.3 mi		2.2	mi		11.	.6 mi		0 mi
Ecological		Bra					_			ological Th		
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		gmites tland		nrub/Scrub and prested Wetland
Liposaros	C) mi		0 mi		0 1	mi		0	mi		0 mi
										gical Thresh		
	Cattai	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		gmites tland		nrub/Scrub and prested Wetland
	1.	7 mi		8.7 mi		0.5	mi		0	mi		0.3 mi
										se Operation		
Socioeconomic Impacts interpretations int								tions and cleanup es, industry, catskill to Esopus, er towns along ck Mile 92; Port				

Rondout 14,000-bbl Heavy Fuel Oil Spill (Summer-Low Tide) Effects

]	Response Equipmen	t and Plan Activati	on		
	NCP and			Response Requiren				Ss Activated ays)
	USCG Type	Tier 1 (24	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n	/a	30 river miles Mile 112-82 2016-31 to 2016-53
]	Respons	e Overview: Expect		hallenge	s	
	Protective B	ooming	Mec	hanical Recovery	Shoreline Clea	nup	Oth	er Challenges
Spill Response	Average river of 1 kt will reduce effectiveness, containment an diversionary bo configurations angled to preve entrainment and over; exclusion deflection conf to be used to pr sensitive areas.	e boom d bom to be ent d splash and igurations	the bu contan shoreli amour recove althou to rem surface self-pr design set up contain	6% evaporation with lk of the spill ninating the ine will reduce tt that can be red mechanically gh 18% is projected ain floating on e; mobilize floating opelled skimmers ed for heavy oils; shoreline nment boom areas acuum-trucks and	About 53% is anti- to cause shoreline contamination and require significant shoreline cleanup contaminated sedi- and debris. Perform SCAT; wetland flu some substrate ren due to penetration sandy beaches; oil structures; oiled do removal.	will of ment, n ishing; noval on ed dock	heavy o significa Potentia shorelin wetland challeng wetland may cau potentia of oil in a signifi respond	bility during a il spill is not a ant danger, il for significant e cleanup, access may be ge; disturbance of s during response use effects; l for entrainment water column not cant factor, ers need to wear ole Tyvek s

Rondout 14,000-bbl Heavy Fuel Oil Spill (Summer-Low Tide) Response

Guuranta	Loca			ource	-	olume		Oil Type	Season		Tide Stage	
Scenario Description	Off Ro Cre			o vessel spill	14	,000 bbl	He	eavy Fuel Oil	Winter		Low	
Spill		Annu	al Prob	ability Any	where	in Hudson	Rive	r			ual Frequency 2015)	
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volume	US		Hudson	
		4.0	073			0.0)31		0		0	
Conditions	Lat/I		Relea	ase Rate	Da	Release ite/Time	-	Model Run Duration	Winds		Water Temperature	
	41.91 -73.90		Insta	ntaneous		nuary 2016 3:00am		30 days	Light / varia (<5 kts)	ble	32°F	
				Mass B	alance	at End of M	lode	Run (After 3	30 Days)			
	Fate	Surf	ace	Atmosph	nere	Water Column	l	Sediment	Ashor	e	Degraded	
	%	5.1	%	3.6%		0.0%		0.0%	68.9%	,	22.4%	
SIMAP Modeling	bbl	71	3	499		4		0	9,651		3,134	
Results			Spatia	al Extent of	Expos	sure over Th	resh	old (Up to 30	Days After Sp	ill)		
	Water (Volume) - EcologicalSurface (Area x Days Exposed)Shoreline (Length)									(Length)		
	Whole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 g/m²)Socioeconomic (0.01 g/m²)Ecological (100 g/m²)									Socioeconomic (1 g/m ²)		
	663 m			mil gal		mi ² -days		.9 mi ² -days	75 mi	/	78 mi	
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
	Be	drock	I	Unconsolida Rock	nsolidated Sand Beach Mud				d or Timber	A	Artificial Shore	
	12	.1 mi		50 mi		0.5	mi		6.5 mi		0 mi	
Ecological		Bra	ckish/E	stuarine W	etland	Habitats Ex	cpose	ed (Miles over	· Ecological Th			
Shoreline Exposures	Salt	marsh	τ	Upper Inter Mix	tidal	Lower In M			hragmites Wetland		hrub/Scrub and prested Wetland	
Exposures	0) mi		0 mi		0 1	ni		0 mi		0 mi	
									ological Thresh			
	Catta	il Marsh	U	Upper Inter Mix	tidal	Lower In M			hragmites Wetland		hrub/Scrub and prested Wetland	
	0.	2 mi		3.8 mi		1.5	mi		0 mi		0.3 mi	
	Potential Socioeconomic Impacts from Spill and Response Operations											
Socioeconomic Impacts	commercial property, and shorefront real estate would be most affected on the west Marlboro, and on the east shore from Rhinebeck to Poughkeepsie. Additional impace other towns along the river. Water intakes that may be affected include: Ulster Mile Rhinebeck Mile 92; Port Ewen Mile 89; Hyde Park Mile 80; Poughkeepsie Mile 77						mic effects; sho nd odor. SCAT arks, marinas, b he west shore fi al impacts may ter Mile 96; Ro	orefrom opera- eacher oom U be ex- ndout and M	nt marinas, tions and cleanup es, industry, JIster to perienced in Mile 92; file 76; IBM Mile			

Rondout 14,000-bbl Heavy Fuel Oil Spill (Winter-High Tide) Effects

	-				t and Plan Activatio		-		
	NCP and		Tier	Response Requiren	nents	G		Ss Activated ays)	
	USCG Type	Tier 1 (2	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles	
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	1	ı/a	20 river miles Mile 93-73 2016-44 to 2016-59	
			0	, 0	ed Outcomes and Cl	hallenge	s		
	Protective B	ooming	Mecl	nanical Recovery	Shoreline Clear	nup	Othe	er Challenges	
	Average river c			% evaporation with	About 69% is antic	ipated		oility during a	
Spill Response	1 kt will reduce	e boom		k of the spill	to cause shoreline	•11	heavy oil spill is not a significant danger,		
~ F	effectiveness, containment an	d		ninating the	contamination and	W1II		nt danger, for significant	
	diversionary bo			t that can be	require significant shoreline cleanup o	f		e cleanup,	
	configurations			red mechanically	contaminated sedin			access may be	
	angled to preve			gh 5% is projected	and debris. Perform	,		e; disturbance of	
	entrainment and			ain floating on	SCAT; wetland flux	shing;		during response	
	over; exclusion			; mobilize floating	some substrate rem			se effects;	
	deflection confi			opelled skimmers	due to penetration of			for entrainment	
	to be used to pr sensitive areas.			ed for heavy oils;	sandy beaches; oile structures; oiled de			water column not cant factor,	
	ice conditions r		i i i i i i i i i i i i i i i i i i i		removal.	0115		ers need to wear	
	boom deployme			acuum-trucks and				le Tyvek	
				ers; potential ice			coveralls		
				ons may affect					
			skimm	er operations.					

Rondout 14,000-bbl Heavy Fuel Oil Spill (Winter-High Tide) Response

Scenario	Loca		_	ource		olume		Oil Type	Season		Tide Stage	
Description	Off Ro Cre			o vessel spill	14	,000 bbl	He	avy Fuel Oil	Winter		Low	
Spill		Annı	ial Prob	ability Any	where	in Hudson	Rive	r			ual Frequency 2015)	
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type a	and `	Volume	US		Hudson	
		4.()73			0.0)31		0		0	
Conditions	Lat/l		Relea	ase Rate	Da	Release ite/Time		Aodel Run Duration	Winds		Water Temperature	
	41.91 -73.90		Insta	ntaneous		nuary 2016 9:00am		30 days	Light / varial (<5 kts)	ole	32°F	
				Mass B	alance	at End of M	lode	Run (After 3	0 Days)			
	Fate	Surf	ace	Atmosph	nere	Water Column	l	Sediment	Ashor	e	Degraded	
	%	4.8	%	3.6%		0.0%		0.0%	69.2%	,	22.4%	
SIMAP Modeling	bbl	66	7	504		2		2	9,692		3,133	
Results		Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill)										
	Water	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)										
		Whole Oil Dissolved Ecological Socioeconomic Ecological Socioeconomic (1 mg/l) (0.001 mg/l) (10 g/m ²) (0.01 g/m ²) (100 g/m ²) (10 g/m ²)										
	538 m	il gal	539	mil gal	0.9	mi ² -days	0	.9 mi ² -days	75 mi		79 mi	
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
	Be	drock	U	Unconsolida Rock	ated	Sand l	Beac	h Muc	l or Timber	A	Artificial Shore	
	12	.3 mi		48.7 mi		1 r	ni		7.4 mi		0 mi	
Ecological		Bra					-		Ecological Th			
Shoreline Exposures	Salt	marsh	U	Upper Inter Mix	tidal	Lower In M			nragmites Wetland		hrub/Scrub and prested Wetland	
Liposuros	C) mi		0 mi		0 1	ni		0 mi		0 mi	
									logical Thresh			
	Cattai	il Marsh	U	Upper Inter Mix	tidal	Lower In M			nragmites Wetland		hrub/Scrub and prested Wetland	
	0.	3 mi		3.9 mi		1.5	mi		0 mi		0.3 mi	
									oonse Operatio			
Socioeconomic Impacts	miles of beaches, would be commerce and on the along the Port Ewe	shoreline parks, an c focused cial prope ne east sh c river. W en Mile 8	would h ad real es on areas erty, and ore from Vater inta 9; Hyde	be oiled abo state would s more heav shorefront r n Red Hook ikes that ma Park Mile 8	ve the be affe ily oile real est to Pou y be af 80; Pou	level of conc cted by oil, in d (about 75 r ate would be ghkeepsie. A fected includ ghkeepsie M	ern f ncluc niles mos dditi le: U ile 7	or socioeconor ling residue an). Riverside pa t affected on th onal impacts n lster Mile 96; I	nic effects; sho d odor. SCAT o rks, marinas, bo ne west shore fr nay be experien Rondout Mile 9 ile 76; IBM Mi	refron opera eache om U ced in 2; Rh	tions and cleanup es, industry, Ilster to Lloyd, n other towns inebeck Mile 92;	

Rondout 14,000-bbl Heavy Fuel Oil Spill (Winter-Low Tide) Effects

	,	,		Response Equipmen		,	-	_
	NCP and			Response Requiren				Ss Activated ays)
	USCG Type	Tier 1 (2	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles
	Major WCD	25,000 ft b 1,000 ft + 3 skimming 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n	/a	20 river miles Mile 95-75 2016-43 to 2016-58
]	Respons	e Overview: Expect		Challenge	S	<u> </u>
	Protective B	ooming	Mec	hanical Recovery	Shoreline Clea	anup	Oth	er Challenges
	Average river c			1% evaporation with	About 69% is anti			bility during a
Spill Response	1 kt will reduce	e boom		lk of the spill	to cause shoreline			il spill is not a
	effectiveness, containment an	d		ninating the	contamination and require significant			ant danger, l for significant
	diversionary bo			it that can be	shoreline cleanup			e cleanup,
	configurations			red mechanically	contaminated sedi			access may be
	angled to preve			gh 5% is projected	and debris. Perform	,		ge; disturbance of
	entrainment and	1		ain floating on	SCAT; wetland flu	\mathcal{O}^{\prime}		s during response
	over; exclusion			e; mobilize floating	some substrate rer		5	ise effects;
	deflection confi to be used to pr			opelled skimmers	due to penetration sandy beaches; oil			l for entrainment water column not
	sensitive areas.				structures; oiled d		0.0.0.0.0.0.0	cant factor,
	ice conditions r			nment boom areas	removal.	coms		ers need to wear
	boom deploym	•	with v	acuum-trucks and			-	ole Tyvek
				ners; potential ice			coverall	s.
				ions may affect				
			skimm	er operations.				

Rondout 14,000-bbl Heavy Fuel Oil Spill (Winter-Low Tide) Response

Newburgh Waterfront Crude-by-Rail 11,000-bbl Bakken Crude Spill

Newburgh CBR 11,000-bbl Bakken Crude Spill (Spring-High Tide) Effects

Scenario	Loca	-		ource		olume		Oil Ty		Season		Tide Stage
Description	Newb Water		CBR	train spill	11	,000 bbl	Ва	akken o	crude	Spring		High
		Annu	al Prob	ability Any	where	e in Hudson	Rive	er				ual Frequency 2015)
Spill Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volun	ne	US		Hudson
		0.000	00046			0.000	0003	5		0.2		0
	Lat/	Lon	Relea	ase Rate		Release ite/Time		/lodel l Durati		Winds		Water Temperature
Conditions	41.51 -74.0 41.50 -74.0	0694)517	Insta	ntaneous	1 A	april 2016 5:00pm		30 da		Light / varia (<5 kts)	ble	43°F
				Mass Ba	alance	at End of N	lode	l Run (After 3) Days)		
	Fate	Sur	face	Atmosp	here	Water Colum		Se	diment	Ashor	e	Degraded
	%	0.1	%	42.39	%	6.3%		(0.2%	8.6%		7.6%
SIMAP Modeling	bbl	e	<u>,</u>	4,650)	695			22	948		834
Results		Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill)										
		Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length) Whole Oil Dissolved Ecological Socioeconomic Ecological Socioeconomic (1 mg/l) (0.001 mg/l) (10 g/m²) (0.01 g/m²) (100 g/m²) (1 g/m²)										
	72,442	mil gal		51 mil gal		mi ² -days	I	4 mi ² -d	-	40 mi		93 mi
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
		drock	(Jnconsolid Rock		Sand	Beac	h		or Timber	A	rtificial Shore
	7.	.2 mi		28.9 mi		-	mi			2.6 mi		0 mi
Ecological		Brac				Habitats Ex	-			Ecological Th		old) rub/Scrub and
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	udai		lix	laai		ragmites /etland		rested Wetland
Exposures	0.	.3 mi		0.2 mi		0	mi		().5 mi		0 mi
		I				-				ogical Thresl		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower I	ntert [ix	idal		ragmites /etland		rub/Scrub and rested Wetland
	0) mi		0.5 mi			mi			0 mi		0 mi
	_	<u> </u>				=		-		onse Operatio		
										or a few days; Evacuation of		
	could ca	use effec	ts on con	mmunities	and bu	sinesses. Fre	eight	rail tra	ffic may	be affected fo	r a fe	w days until the
										be oiled above te would be af		level of concern
Socioeconomic Impacts										l on areas mor		
Impuets												front real estate
												e from Beacon akes that may be
	affected	include:	Danskar	nmer Mile	66; Ch	elsea Mile 6	6; Ro	oseton	Mile 65;	Charles Point	t Mile	e 43; Indian
									fishing	advisories wou	uld li	kely be
	msitute	u ior cert	am parts	of the five	i ili ule	e vicinity of	ule s	pin.				

3	,				and Plan Activation		/	
	NCP and			Response Require				Ss Activated ays)
	USCG Type	Tie	er 1	Tier 2	Tier 3	Rail	Miles	River Miles
	Major Not defined	No requ	irement	No requirement	No requirement	QR-58	1 miles 8 to QR- 56	22 river miles Mile 62-40 2016-68 to 2016-85
		R	esponse (Overview: Expecte	ed Outcomes and C	hallenge	es	
	Protective Boo	oming	Mecha	nical Recovery	Shoreline Clear	nup	Othe	r Challenges
Spill Response ¹⁶	Average river cur 1 kt will reduce b effectiveness, containment and diversionary bood configurations to angled to prevent entrainment and over; exclusion a deflection config to be used to prot sensitive areas.	m be splash nd urations	rapid sp reduce a be recov mechani floating skimmer shorelin boom ar	ically; mobilize self-propelled rs; set up e containment eas with -trucks and	About 23% is antic to cause shoreline contamination. Per SCAT; wetland flu some substrate rem due to penetration sandy beaches; oild dock structures; oi debris removal.	form ishing; noval on ed	Bakken significa high ben area arou wetland challeng wetlands response effects; j entrainm water co water int concerns areas nea prior to o water co	nt danger, as are izene vapors in and the spill; access may be e; disturbance of

Newburgh CBR 11,000-bbl Bakken Crude Spill (Spring-High Tide) Response

¹⁶ At this time, there is no federal regulatory requirement for any specific contracted tiered response resource requirement. This does not mean that no response will take place.

	Loca	-		ource		olume		Oil Ty		Season		Tide Stage
Scenario Description	Newburgh Waterfront CBR train					,000 bbl		akken o	-	Spring		Low
Spill		Annu	al Proba	ability Any	where	in Hudson	Rive	er				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volun	ne	US		Hudson
		0.000	00046			0.000	0003	5		0.2		0
	Lat/I		Relea	ise Rate		Release te/Time		/lodel] Durati		Winds		Water Temperature
Conditions	41.51 -74.00 41.50 -74.00)694 517	Inst	antaneous		April 2016 1:00am		30	days	Light / variab (<5 kts)	ole	43°F
				Mass Ba	lance	at End of M	lodel	Run (After 3	0 Days)		
	Fate	Surf	ace	Atmospl	nere	Water Columr		See	diment	Ashor	e	Degraded
	%	0.0	%	25.9%	6	7.5%		().4%	4.2%		13.5%
SIMAP Modeling	bbl	3		2,853	;	827			39	462		1,489
Results			Spatial	Extent of	Expos	ure over Th	resh	old (U	p to 30	Days After Sp	ill)	
	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)											
	$(1 \text{ mg/l}) \qquad (0.001 \text{ mg/l}) \qquad (10 \text{ g/m}^2) \qquad (0.01 \text{ g/m}^2) \qquad (100 \text{ g/m}^2) \qquad (1 \text{ g/m}^2)$										Socioeconomic (1 g/m ²)	
	100,462	mil gal		95 mil gal		3 mi ² -days 3 mi ² -days			-	34 mi		73 mi
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
		drock		Inconsolida Rock	ated	Sand		h		or Timber	A	rtificial Shore
	5.	7 mi		24.1 mi		0 1				3.4 mi		0 mi
Ecological		Brac				Habitats Ex Lower I	-			Ecological Th ragmites		old) nrub/Scrub and
Shoreline	Salt	marsh	U	pper Inter Mix	liuai	M		iaai		Vetland		rested Wetland
Exposures	0.	1 mi		0.3 mi		0 1	mi			0.1 mi		0 mi
		ŀ	reshwa	ter Wetlan	d Hab					logical Thresł		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		rub/Scrub and rested Wetland
	C) mi		0.1 mi		0 1				0 mi		0 mi
										onse Operatio		
Socioeconomic Impacts	precautic could ca derailed for socio includin (about 3- would be to Cortla affected Point Mi	onary cle- use effec and/or bu seconomi g residue 4 miles). e most af indt. Add include: lle 42; W	arance z ts on con urned tra c effects and odo Riversic fected on itional in Danskar est Have	ones might nmunities a in cars are i ; shorefrom r. SCAT op le parks, ma n the west s npacts may nmer Mile (rrstraw Mile	cause : and bus remove t marin peration arinas, hore fr be exp 66; Che e 38. A	further impa sinesses. Fre ed. 73 miles uas, beaches, ns and clean beaches, ind om Newbur perienced in elsea Mile 6	icts to ight i of sh park up w lustry gh to othe 6; Ro ecaut	o vesse rail traf toreline s, and ould be y, comp Haver r towns oseton tionary	I traffic. ffic may e would real esta e focuse mercial p straw, a s along t Mile 65:	be oiled above the would be af d on areas mor property, and s nd on the east	pop r a fe the fecte re hea hore shore r inta Mile	ulated areas ew days until the level of concern ed by oil, avily oiled front real estate e from Beacon akes that may be e 43; Indian

Newburgh CBR 11,000-bbl Bakken Crude Spill (Spring-Low Tide) Effects

	- ,						/	
			Res	sponse Equipment	and Plan Activat	ion		
	NCP and		Tier l	Response Require	ments	GI		Ss Activated ays)
	USCG Type	Tie	r 1	Tier 2	Tier 3	Rail	Miles	River Miles
	Major Not defined	No requi	irement	No requirement	No requirement	2 rail miles QR-58 to QR- 56		22 river miles Mile 62-41 2016-68 to 2016-83
		R	Overview: Expecte	ed Outcomes and	Challenge	es		
	Protective Boo	oming		anical Recovery	Shoreline Cle	-	Oth	er Challenges
Spill Response ¹⁷	Average river cur 1 kt will reduce b effectiveness, containment and diversionary boo configurations to angled to prevent entrainment and over; exclusion a deflection config to be used to prot sensitive areas.	m be splash nd urations	rapid sp reduce a be recov mechani floating skimme shorelin boom at	ically; mobilize self-propelled rs; set up the containment reas with -trucks and	About 23% is ant to cause shorelind contamination. Po SCAT; wetland f some substrate re due to penetration sandy beaches; of dock structures; of debris removal.	e erform lushing; moval 1 on iled	Bakken significa high ber area aro wetland challeng wetland respons effects; entrainr water co water in concern areas ne prior to water co	bility during a spill is a ant danger, as are nzene vapors in und the spill; access may be ge; disturbance of s during e may cause potential for nent of 24% in blumn leading to take and fish kill s especially in ear the spill site dilution; perform blumn tracking, monitoring.

Newburgh CBR 11,000-bbl Bakken Crude Spill (Spring-Low Tide) Response

¹⁷ At this time, there is no federal regulatory requirement for any specific contracted tiered response resource requirement. This does not mean that no response will take place.

	Location Newburgh			ource		olume		Oil Ty		Season		Tide Stage
Scenario Description	Newb Water		CBR t	rain spill	11	,000 bbl	Ва	akken o	crude	Summer		High
Spill		Annu	al Proba	ability Any	where	in Hudson	Rive	er				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volun	ne	US		Hudson
		0.000	00046			0.000		-		0.2		0
	Lat/I		Relea	nse Rate	Release Date/Time		Model Run Duration			Winds		Water Temperature
Conditions	41.51 -74.00 41.50 -74.00	0694 0517	Instar	ntaneous		1gust 2016 1:30pm	30 days		ys	NW / Light (<6 kts)		81°F
				Mass Ba	alance	at End of M	lode	Run	After 30	Days)		
											Degraded	
	%	0.0	%	50.79	%	23.9%		(0.0%	22.5%)	2.8%
SIMAP Modeling	bbl	0 5,579 2,631 5 2,4							2,479		306	
Results		Spatial Extent of Exposure over T					iresh	old (U	p to 30 I	Days After Sp	oill)	
		· (Volum		8		face (Area x	•	-	-			(Length)
	Whol (1 m			ssolved 01 mg/l)	(1	cological 0 g/m ²)		(0.01 g		Ecologica (100 g/m ²)		Socioeconomic (1 g/m ²)
	28,220	mil gal	32,09	3 mil gal	9 mi ² -days			9 mi^2 -d	ays	45 mi		54 mi
	Shoreline Exposure by Shore Type (Miles over Ecological Threshold								ld)			
	Bedrock		Jnconsolid Rock		Sand	Beac	h		or Timber	A	rtificial Shore	
	4.	4 mi		34.8 mi	0 mi			2.9 mi			0 mi	
Ecological		Brackish/Estuarine Wetland Habitats Exposed (Miles over Ecological Threshold)										
Shoreline	Salt	marsh	U	pper Inter Mix	udai	tidal Lower In Mi				agmites etland		rub/Scrub and rested Wetland
Exposures	C) mi		0 mi		0 mi				0 mi		0 mi
		ŀ				-				ogical Thresl		
	Cattai	il Marsh	U	pper Inter Mix	tidal	Lower I		idal		agmites etland		rub/Scrub and rested Wetland
	0.	1 mi		3.3 mi		0 1	mi			0 mi		0 mi
	D					-		-	-	onse Operatio		
Socioeconomic Impacts	precautic could ca derailed for socio includin (about 4. would be to Cortla affected Point Mi	onary cle use effec and/or bu peconomi g residue 5 miles). e most af undt. Add include: ile 42; W	arance z ts on con urned tra c effects and odo Riversic fected on itional in Danskar est Have	ones might mmunities in cars are s; shorefrom or. SCAT of le parks, m n the west mpacts may nmer Mile erstraw Mil	cause and bus remove it marin peratio arinas, shore fi y be ex 66; Ch e 38. A	further impa sinesses. Fre ed. 54 miles has, beaches, ns and clean beaches, ind com Newbur perienced in elsea Mile 6	of sh of sh park up w dustry gh to othe 6; Ro recaut	o vesse rail tra norelin- ts, and ould b y, comp o Haven r town oseton tionary	I traffic. ffic may e would l real estate e focused mercial p rstraw, ar s along the Mile 65;	be oiled above the would be af l on areas mor roperty, and s ad on the east	f pop r a fe the fecte re hea shore shore r inta	ulated areas ew days until the level of concern ed by oil, avily oiled front real estate e from Beacon akes that may be e 43; Indian

Newburgh CBR 11,000-bbl Bakken Crude Spill (Summer-High Tide) Effects

Newburgh CBR 11,000-bbl Bakken Crude Spill (Summer-High Tide) Response

			Re	sponse Equipment	t and Plan Activat	ion		
	NCP and		Tier I	Response Require	ments	GI	RPs/ GRS (7 d	os Activated ays)
	USCG Type	Tier	r 1	Tier 2	Tier 3	Rail	Miles	River Miles
	Major Not defined	No requi	irement	No requirement	No requirement	QR-58	miles to QR- 6	22 river miles Mile 62-41 2016-68 to 2016-83
		Re	esponse (Overview: Expected	ed Outcomes and	Challeng	es	
	Protective Boo	oming	Mecha	anical Recovery	Shoreline Cle	anup	Oth	er Challenges
Spill Response ¹⁸	Average river cur 1 kt will reduce b effectiveness, containment and diversionary boor configurations to angled to prevent entrainment and s over; exclusion a deflection config to be used to prot sensitive areas.	oom m be splash nd urations	rapid sp reduce a be recov mechani floating skimme shorelin boom at	ically; mobilize self-propelled rs; set up le containment reas with -trucks and	About 39% is ant to cause shoreline contamination. Po SCAT; wetland ff some substrate re due to penetration sandy beaches; of dock structures; of debris removal.	e erform lushing; moval 1 on iled	Bakken significa high ber area aro wetland challeng wetland may cau potentia of 12% leading and fish especial the spill dilution	bility during a spill is a ant danger, as are izene vapors in und the spill; access may be ge; disturbance of s during response ise effects; I for entrainment in water column to water intake kill concerns ly in areas near site prior to ; perform water tracking, and air ing

¹⁸ At this time, there is no federal regulatory requirement for any specific contracted tiered response resource requirement. This does not mean that no response will take place.

Scenario	Loca		So	ource	V	olume		Oil Typ	pe	Season		Tide Stage
Description	Newb Water	U	CBR t	rain spill	11	,000 bbl	Ва	akken ci	rude	Summer		Low
Spill		Annu	al Proba	ability Any	where	e in Hudson	Rive	er				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any V	Volume)	S	pill of Type	and	Volum	e	US		Hudson
		0.000	00046			0.000	0003	5		0.2		0
	Lat/I	-	Relea	Release Rate		Release Date/Time		Model Run Duration		Winds		Water Temperature
Conditions	41.5 -74.00 41.50 -74.00	517	Instar	ntaneous		7 August 2016 6:30am		30 days	5	NW / light (<6 kts)		81°F
				Mass Ba	alance	at End of M	lode	Run (A	After 30	Days)		
	Fate	Surf	ace	Atmosp	here	Water Columr		Sed	iment	Ashor	e	Degraded
	%	0.0	%	50.7%		26.2%		0	.1%	20.1%		3.0%
SIMAP Modeling	bbl	0)	5,580	0	2,879			6	2,209		327
Results		Spatial Extent of				ure over Th	resh	old (Up	o to 30 D	ays After Sp	ill)	
	Water	· (Volum	e) – Eco	ological	Sur	face (Area x	. Day	's Expo	sed)	Shore	line	(Length)
	Whol (1 n	le Oil 1g/l)		ssolved 01 mg/l)	(1	cological l0 g/m ²)		cioecon (0.01 g/	-	Ecological (100 g/m ²)		Socioeconomic (1 g/m ²)
	18,129	mil gal	53,42	8 mil gal	11	mi ² -days	11 mi ² -days		ays	45 mi		52 mi
	Shoreline Exposure by Shore Type (Miles over Ecological Threshold)											
	Bee	Bedrock			ated	Sand	Beac	h	Mud o	or Timber	А	rtificial Shore
	2.	8 mi		36.1 mi	0 mi			2	2.3 mi		0 mi	
Ecological		Brac					-			Ecological Th		
Shoreline Exposures	Salt	marsh	U	Upper Intertidal Mix		Lower Intertidal Mix		idal		agmites etland	Shrub/Scrub an Forested Wetlan	
Exposures	C) mi		0 mi		0 mi			0 mi		0 mi	
		I								ogical Thresh		
	Cattai	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		rub/Scrub and rested Wetland
	C) mi		2.8 mi		0.6	mi			0 mi		0.1 mi
						-		-	-	onse Operatio		
	precaution could car	onary cle use effec	arance z ts on coi	ones might	cause and bu	further impa sinesses. Fre	tets to	o vessel rail trafi	traffic. I fic may l		pop r a fe	
Socioeconomic Impacts	for socio including (about 4: would be Wapping intakes t	economi g residue 5 miles). e most af ger to Phi hat may l	c effects and odo Riversic fected or lipstown be affect	s; shorefrom or. SCAT og le parks, m n the west s n. Addition red include:	it marii peratio arinas, shore fi al impa : Dansk	has, beaches, ns and clean beaches, ind rom Newbur acts may be cammer Mile	, park up w lustry gh to exper e 66;	ts, and r rould be y, comm Highla rienced Chelsea	eal estat focused nercial pr inds, and in other a Mile 66	e would be af on areas mor	fecte re hea hore hore he ri ile 65	d by oil, avily oiled front real estate from ver. Water 5. Additional

Newburgh CBR 11,000-bbl Bakken Crude Spill (Summer-Low Tide) Effects

Newburgh CBR 11,000-bbl Bakken Crude Spill (Summer-Low Tide) Response

			Re	sponse Equipment	t and Plan Activat	ion		
	NCP and		Tier I	Response Require	ments	GI	RPs/ GRS (7 d	Ss Activated ays)
	USCG Type	Tie	r 1	Tier 2	Tier 3	Rail	Miles	River Miles
	Major Not defined	No requi	irement	No requirement	No requirement	QR-58	miles to QR- 6	9 river miles Mile 65-54 2016-66 to 2016-74
		R	esponse (Overview: Expect	Challeng	es		
	Protective Boo	oming	Mecha	anical Recovery	Shoreline Cle	anup	Oth	er Challenges
Spill Response ¹⁹	Average river cur 1 kt will reduce b effectiveness, containment and diversionary boon configurations to angled to prevent entrainment and s over; exclusion an deflection config to be used to prot sensitive areas.	oom n be splash nd urations	rapid sp reduce a be recov mechani floating skimme shorelin boom at	ically; mobilize self-propelled rs; set up te containment reas with -trucks and	About 20% is ant to cause shoreline contamination. Po SCAT; wetland ff some substrate re due to penetration sandy beaches; oi dock structures; o debris removal.	e erform lushing; moval 1 on iled	Bakken significa high ber area aro wetland challeng wetland may cau potentia of 26% leading and fish especial the spill dilution	bility during a spill is a ant danger, as are nzene vapors in und the spill; access may be ge; disturbance of s during response use effects; l for entrainment in water column to water intake kill concerns ly in areas near site prior to ; perform water tracking, and air

¹⁹ At this time, there is no federal regulatory requirement for any specific contracted tiered response resource requirement. This does not mean that no response will take place.

	Loca			ource		olume		Oil Ty		Season		Tide Stage
Scenario Description	Newb Water	urgh		train spill		,000 bbl		akken	-	Winter		High
Spill			al Proba	ability Any	where	in Hudson	Rive	er				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volun	ne	US		Hudson
		0.000	00046			0.000	0003	5		0.2		0
	Lat/I		Relea	ase Rate		Release ate/Time		1odel 1 Durati		Winds		Water Temperature
Conditions	41.51 -74.00 41.50 -74.00)694)517	Instar	ntaneous		nuary 2016 3:00pm		30 day	/S	SW / light (<8 kts)		32°F
				Mass Ba	alance	at End of M	lode	Run	(After 3	Days)		
	Fate	Surf	ace	Atmosp	here	Water Colum		Se	diment	Ashor	e	Degraded
	%	0.0	%	44.29	%	11.9%			0.2%	39.3%)	4.4%
SIMAP Modeling	bbl	3 4,861 1,306 18						4,326		486		
Results			Spatial	Extent of	Expos	ure over Th	resh	old (U	p to 30 l	Days After Sp	oill)	
		· (Volum	1	0		face (Area x	•	-				(Length)
	Whol (1 n			ssolved 01 mg/l)	(1	cological 10 g/m ²)		(0.01 g		Ecologica (100 g/m ²)		Socioeconomic (1 g/m ²)
	11,574	mil gal	73,08	3 mil gal	2 1	u ² -days 2 mi ² -d			ays	60 mi		64 mi
				ine Exposi Jnconsolid	sure by Shore Type (Miles over Ed				r Ecolog	gical Thresho	ld)	
	-	Bedrock				Sand		h		or Timber	A	rtificial Shore
	9.	3 mi		44.4 mi	0 mi				5.4 mi		0 mi	
Ecological		Brac			etland Habitats Exposed (Mil				liles over Ecological Tl Phragmites			
Shoreline	Salt	marsh	U	Upper Intertidal Mix		Lower Intertidal Mix			etland	Shrub/Scrub an Forested Wetlar		
Exposures	C	mi		0.2 mi		0 mi			0 mi	0 mi		
		F								ogical Thresl		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower I		idal		agmites /etland		rub/Scrub and rested Wetland
	0	mi		1 mi			mi			0 mi		0 mi
	Potential Socioeconomic Impacts from Spill and Response Operations Response operations may cause some impacts to vessel traffic along river for a few days; evacuations											
Socioeconomic Impacts	precautic could ca derailed for socio includin (about 6 would be Poughke intakes t	onary clea use effect and/or bu economi g residue 0 miles). e most af epsie to 1 hat may b	arance z ts on con urned tra c effects and odo Riversio fected on Peekskil pe affect	ones might mmunities in cars are s; shorefrom or. SCAT of le parks, m n the west 1. Addition ed include:	cause and bu remov t marin peratio arinas, shore fi al impa	further impa sinesses. Fre ed. 64 miles has, beaches, ns and clean beaches, ind rom Marlbon acts may be cammer Mile	acts to eight : of sh park up w dustry ro to : expense e 66;	o vesse rail tra torelin ts, and ould b y, com Stony tienced Chelse	I traffic. ffic may e would real esta e focused mercial p Point, an I in other a Mile 6	Evacuation of be affected fo be oiled above te would be af l on areas mor	f pop r a fe the fecte re hea hore hore hore file 65	ulated areas ew days until the level of concern ed by oil, avily oiled front real estate from ver. Water 5. Additional

Newburgh CBR 11,000-bbl Bakken Crude Spill (Winter-High Tide) Effects

				sponse Equipment			,	
	NCP and			Response Require				Ss Activated ays)
	USCG Type	Tier 1		Tier 2	Tier 3	Rail	Miles	River Miles
	Major Not defined	No requirer	ment	No requirement	No requirement	2 rail miles QR-58 to QR- 56		20 river miles Mile 68-48 2016-64 to 2016-78
		Resp	ponse (Challeng	es			
	Protective Boo	oming 1	Mecha	anical Recovery	Shoreline Cle	anup	Oth	er Challenges
Spill Response ²⁰	Average river cur 1 kt will reduce b effectiveness, containment and diversionary bood configurations to angled to prevent entrainment and s over; exclusion a deflection config to be used to prot sensitive areas. Potential ice cond may negatively in boom deploymen	oom ra re be m m be flo sk splash sh nd bo urations va ect sk Po litions m npact sk	apid sp educe a e recovnechan loating kimme horelin oom ar acuum kimme Potentia nay neg	ically; mobilize self-propelled rs; set up te containment reas with -trucks and	About 39% is ant to cause shorelind contamination. Po SCAT; wetland f some substrate re due to penetration sandy beaches; of dock structures; of debris removal.	e erform lushing; moval n on iled	Bakken significa high ber area aro wetland challeng wetland may cau potentia of 12% leading and fish especial the spill dilution	bility during a spill is a ant danger, as are nzene vapors in und the spill; access may be ge; disturbance of s during response use effects; al for entrainment in water column to water intake kill concerns ly in areas near site prior to ; perform water tracking, and air ing

Newburgh CBR 11,000-bbl Bakken Crude Spill (Winter-High Tide) Response

 $^{^{20}}$ At this time, there is no federal regulatory requirement for any specific contracted tiered response resource requirement. This does not mean that no response will take place.

¹⁰³ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

Seer and a	Loca			ource		olume		Oil Ty		Season		Tide Stage
Scenario Description	Newb Water		CBR	train spill	11	,000 bbl		akken o	-	Winter		Low
Spill		Annu	al Prob	ability Any	where	e in Hudson	Rive	er				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volun	ne	US		Hudson
		0.000	00046			0.000				0.2		0
	Lat/l		Relea	ase Rate	Release Date/Time			/lodel] Durati		Winds		Water Temperature
Conditions	41.51 -74.00 41.50 -74.00	0694 0517	Instar	ntaneous	1 January 2016 9:00am			30 day	/S	SW / light (<8 kts)	t	32°F
				Mass Ba	alance	at End of M	lode	Run	(After 3	0 Days)		
	Column									Ashor	e	Degraded
	%	0.0	%	43.99	6	12.2%		(0.0%	39.0%)	4.9%
SIMAP Modeling	bbl	1 5 4,829 1,338 5 4,286									536	
Results			Spatial	Extent of	Expos	ure over Th	resh	old (U	p to 30	Days After Sp	oill)	
		· (Volum		8		face (Area x	•	-				(Length)
	Whol (1 n			ssolved 01 mg/l)		cological 10 g/m ²)		cioeco (0.01 g	nomic g/m ²)	Ecologica (100 g/m ²)		Socioeconomic (1 g/m ²)
	14,582	mil gal		2 mil gal	2 1	mi ² -days	2 mi ² -days			58 mi		62 mi
					posure by Shore Type (Miles over Ecolo				er Ecolo	gical Thresho	ld)	
	Be	drock	ι	Jnconsolid Rock	ated	Sand	Beac	h	Mud	or Timber	A	artificial Shore
	9.	3 mi		43.4 mi	0 mi			4 mi			0 mi	
Ecological		Brac					-		Miles over Ecological Th			
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower I				ragmites Vetland		nrub/Scrub and prested Wetland
Exposures	C) mi		0.2 mi			mi			0 mi		0 mi
		F	reshwa	ter Wetlar	nd Hab	itats Expos	ed (N	Ailes o	ver Eco	logical Thresl	hold)
	0.	1 mi		1.6 mi		0	mi			0 mi		0 mi
	0.	1 mi		1.6 mi		0	mi			0 mi		0 mi
										onse Operatio		
Socioeconomic Impacts	precautic could ca derailed for socio includin (about 5) would be Poughke intakes t	onary clea use effect and/or bu economi g residue 8 miles). e most af cepsie to l hat may b	arance z ts on con urned tra c effects and odc Riversic fected of Peekskil pe affect	ones might mmunities ain cars are s; shorefrom or. SCAT of le parks, m n the west 1. Addition red include:	cause and bu remov t marin peratio arinas, shore fi al impa Dansk	further impa sinesses. Fre ed. 62 miles has, beaches ns and clean beaches, ind rom Marlbon acts may be cammer Mile	acts to eight : of sh park up w dustry ro to expense e 66;	o vesse rail tra norelin (s, and ould b y, com Stony cienced Chelse	I traffic. ffic may e would real esta e focuse mercial p Point, ar l in other ca Mile 6	be oiled above ate would be af d on areas mor	f pop r a fe the fecto fecto the hore hore hore file 65	ulated areas ew days until the level of concern ed by oil, avily oiled front real estate from ver. Water 5. Additional

Newburgh CBR 11,000-bbl Bakken Crude Spill (Winter-Low Tide) Effects

				sponse Equipment			,	•			
	NCP and		Tier l	Response Require	ments	GI		Ss Activated ays)			
	USCG Type	Tier 1		Tier 2	Tier 3	Rail	Miles	River Miles			
	Major Not defined	No require	ement	No requirement	No requirement	2 rail miles QR-58 to QR- 56		20 river miles Mile 68-48 2016-64 to 2016-78			
		Response Overview: Expected Outcomes and Challeng									
	Protective Boo	oming	Mecha	anical Recovery	Shoreline Cle	anup	Oth	er Challenges			
Spill Response ²¹	Average river cur 1 kt will reduce b effectiveness, containment and diversionary bood configurations to angled to prevent entrainment and s over; exclusion a deflection config to be used to prot sensitive areas. Potential ice cono may negatively in boom deploymen	boom r r be f splash s nd b urations v rect s f ditions n mpact s	rapid sp reduce a be recove mechani floating skimme shorelin boom ar vacuum skimme Potentia may neg	ically; mobilize self-propelled rs; set up le containment reas with -trucks and	About 39% is ant to cause shorelind contamination. Po SCAT; wetland f some substrate re due to penetration sandy beaches; of dock structures; of debris removal.	e erform lushing; moval n on iled	Bakken significa high ber area aro wetland challeng wetland may cau potentia of 12% leading and fish especial the spill dilution	bility during a spill is a ant danger, as are nzene vapors in und the spill; access may be ge; disturbance of s during response use effects; al for entrainment in water column to water intake kill concerns ly in areas near site prior to ; perform water tracking, and air ing.			

Newburgh CBR 11,000-bbl Bakken Crude Spill (Winter-Low Tide) Response

²¹ At this time, there is no federal regulatory requirement for any specific contracted tiered response resource requirement. This does not mean that no response will take place.

Newburgh	Location	Sou		Volume	Oil Type	Seas		Tide
Scenario Description	Newburgh Waterfront	CBR	train train	11,000 bbl	Bakken crude		Vinter	High
6:11		An	nual Pr	obability		Historic	cal Annu (2000-2	al Frequency 015)
Spill Probability	Spill of Typ	e in Huds	on	Spill Volum	e in Hudson	US	5	Hudson
	0.000	000046		0.000	00035	0.2	2	0
	Lat/Lon	Release	e Rate	Release Date/Time	Run Duration	Win	ds	Temperature
Conditions	41.51523 -74.00694 41.50517 -74.00572	Instantaneous		1 January 30 days 2016 3:00pm		SW / (<8		32°F
Fire/Explosion	Pool Fir			Pool Fire	Vapor			Cloud Explosion
Probabilities	Probability/In 0.086	cident		Probability 0.00000003	Explosion 0.02			robability)000000084
	Emergency	v Respons		Evacuat			alth/Safe	
Fire/Explosion Response ²²	Specific incident be made early as attack fire or allow Port of Albany ha firefighting vesse a 1,500 gpm wate Kingston, Albany FD have NYS sup trailers w/monitor oil derailment fire	to whether w it to bur as small l, <i>Marine</i> r monitor and New oplied foar rs for rail o	r to m out. / with burgh m	As an immediate measure, isolate for at least 50 m in all directions. Large Spill • Consider initial evacuation for at meters (1000 fee Fire • If tank, rail car involved in a fire 800 meters (1/2 directions; also, evacuation for 80 mile) in all direc	spill or leak area eters (150 feet) downwind least 300 t). or tank truck is e, ISOLATE for mile) in all consider initial 20 meters (1/2	may irritate may produc, and/or toxic dizziness or Light, sweet contain ligh as butane an gases have t flammable g released, wh with an igni oils may also sulfide, a to: material, in car. Due to to oil, in an acc behavior of from that of (sweet) crud heavier (sou	or burn s e irritatin gases. V suffocati crude oi ter flamm d propan been remo gasses car een they c tion sourc o contain xic inhala the vapor the charace cident scet this produ gasoline le oils to o r) crude o	apors may cause on. Is will normally table gasses such e (unless these oved). These a readily ignite if tome in contact ce. These crude hydrogen tion hazard space of the tank cteristics of crude enario, the act may range for the lighter diesel fuel for the
					T'	for responde		
	Flammable Distance	Tat	.1	-	pacts from Fire		trial	Dublia Usa
	581 feet	Tota		Residential 0 acres	Commercial 0.1 acre	I Indus		O.1 acre
	301 1001	0.2 acre		0 acres	0.1 acre	0 ac	103	
Safety Impacts				Impor	ts from Evologi	on (Acres)		
Safety Impacts	Downwind Distance	Tota		Impac Residential	ts from Explosi		trial	Public Use

Newburgh CBR 11,000-bbl Bakken Crude Spill with Fire/Explosion

²² If concurrent with a spill to the water, see also spill response tables. If there is a fire and/or explosion, some or even most of the oil may be consumed by the fire, reducing the amount of oil that would spill into the river and affect shorelines. In most cases, it would be necessary to conduct at least some oil spill cleanup in addition to fire-fighting, though those operations would be secondary to emergency fire-fighting operations.

Bear Mountain Bridge 2,500-bbl Home Heating Oil Spill

Bear Mountain 2,500-bbl Home Heating Oil Spill (Spring-High Tide) Effects

		-						<u> </u>				
Scenario	Loca	tion		ource	•	olume		Oil Ty	pe	Season		Tide Stage
Description	Bear Mo Bric		cc	Tanker ollision n vessel	2,	,500 bbl	Н	ome he oil		Spring		High
Spill		Ann	ıal Prob	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	S	pill of Type	and	Volum	e	US		Hudson
		0.7	732		0.024					0.58		0
Conditions	Lat/		Relea	lease Rate Da		Release nte/Time	Model Durat			Winds		Water Temperature
Conditions	41.32198 -73.9831		Instant	Instantaneous		April 2012 2:00am		30 da	ys	SW / light (<4 kts)		45°F
				Mass B	Mass Balance a		lode	l Run (After 30	Days)		
	Fate	Sur	face	Atmospl	here	Water Column	l	Se	diment	Ashore	e	Degraded
	%	0.0	1%	67.8%	6	1.3%		(0.7%	15.7%		4.3%
SIMAP	bbl				5	32			17	393		108
Modeling Results			Spatia	al Extent of	Expo	sure over Th	resh	old (U	p to 30 E	ays After Spi	ll)	-
	Water (Volume) – Eco			ological	Sur	face (Area x	Day	s Expo	osed)	Shore	eline	(Length)
	Who (1 n	le Oil ng/l)		ssolved 01 mg/l)		cological 10 g/m²)		ocioeco (0.01 g		Ecologica (100 g/m ²)		Socioeconomic (1 g/m ²)
	3,293 mil gal 6,680) mil gal	5 1	mi ² -days	1	12 mi^2 -	days	15 mi		55 mi	
			Shore	eline Expos	ure by	Shore Type	e (Mi	les ove	r Ecolog	ical Threshol	d)	
	Be	Bedrock			ated	Sand	Beac	h	Mud	or Timber	A	Artificial Shore
	3.4	43 mi		9.99 mi 0					1	1.46 mi		0 mi
Facharat		Bra	ckish/E	stuarine W	etland	and Habitats Exposed (Miles			les over Ecological Th		reshold)	
Ecological Shoreline	Salt	marsh	U	pper Inter	tidal	Lower Intertidal		Phragmites		Shrub/Scrub a		
Exposures	0.7	21 mi		Mix 0 mi		Mix 0 mi			7 etland 0 mi	Forested Wetland		
	0	21 111	Freshw	-	nd Hal	-		Miles o		ogical Thresh	old)	0 111
	~		T	pper Inter		Lower I				agmites	-	hrub/Scrub and
	Catta	il Marsh		Mix		М				etland		prested Wetland
	() mi		0 mi		0 1	ni			0 mi		0 mi
						=		-		onse Operatio		
Socioeconomic Impacts	would be estate we areas mo shorefrom from Hy intakes th	e oiled ab ould be a ore heavil nt real es de Park t hat may b	ove the ffected b y oiled (tate wou o Peeksk oe affecto	level of con y oil, incluc about 15 mi ld be most a cill. Additio ed include:	cern fo ling res iles). R affected nal imp Hyde F	r socioecono sidue and odo iverside park l on the west pacts may be Park Mile 80;	omic or. SO s, ma shor expe Pou	effects CAT op arinas, e from crienced ghkeep	shorefro berations beaches, Lloyd to l in other sie Mile	nt marinas, be and cleanup w industry, com Stony Point, a towns along t 77; Highland M	ache ould merc and c he ri Mile	76; IBM Mile
	intakes that may be affected include: Hyde Park Mile 80; Poughkeepsie Mile 77; Highland Mile 76; I 72; Danskammer Mile 66; Chelsea Mile 66; Roseton Mile 65; Charles Point Mile 43; Indian Point M Additional precautionary fishing advisories would likely be instituted for much or all of the river.						nt Mile 42.					

]	Response Equipmer	nt and Plan Activa	tion		·	
	NCP and			Response Requiren				Ss Activated ays)	
	USCG Type	Tier 1 (24	4 hrs)	Tier 2	Tier 3	Rail N	Ailes	River Miles	
	Major MMPD	4,000 ft bo 1,000 ft + 1 skimming 1,200 bbl/c 2,400 bbl s	300 per system lay	n/a	n/a	n/	a	7 river miles Mile 44-77 2016-81 to 2016-80	
]	Respons	se Overview: Expec	ted Outcomes and	Challenges			
	Protective B	Booming	Mec	hanical Recovery	Shoreline Cl	eanup	Oth	er Challenges	
Spill Response	High currents a 0.7 kts will red effectiveness, containment an diversionary bc configurations angled to preve entrainment and over; exclusion deflection confi to be used to pr sensitive areas.	d bom to be ent d splash and igurations rotect	rapid s reduce recove mobili propel up sho boom	evaporation and spreading will e amount that can be ered mechanically; ize floating self- lled skimmers; set oreline containment areas with vacuum- and skimmers.	About 16% is an to cause shorelin contamination. F SCAT; wetland some substrate n due to penetratic sandy beaches; o structures; oiled removal.	e Perform flushing; emoval on on oiled dock	challen wetland may can potentia entraini column intake a concerr areas no to diluti	ad access may be ge; disturbance of ls during response use effects; al for $>1\%$ ment in water may lead to water and fish kill as especially in ear spill site prior ton; perform water tracking, and air ring.	

Bear Mountain 2,500-bbl Home Heating Oil Spill (Spring-High Tide) Response

		Location Source Volume Oil Type Season Tide Stag Marcin Tanker Marcin Marci									
Scenario	Loca	uon			v	olume	C	JII I ype	Season		1 de Stage
Description	Bear Mo Bric		сс	anker ollision 1 vessel	2,	500 bbl	Hoi	me heating oil	Spring		Low
Spill		Annu	ıal Prob	ability Any	where	in Hudson	River		Historical	Ann 2000-	ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	S	oill of Type	and V	olume	US		Hudson
·		0.7	732			0.0)24		0.58		0
Conditions	Lat/I		Relea	ase Rate	Da	kelease te/Time	Model Run Duration		Winds		Water Temperature
Conditions	41.32 -73.98		Insta	ntaneous	2 April 2012 9:00am		30 days		SW / ligh (<4 kts)	t	45°F
				Mass B	alance		lodel l	Run (After 3	0 Days)		
	Fate	Surf	face	Atmospl	here	Water Column	1	Sediment	Ashor	e	Degraded
	%	0.0	0% 55.7%			5.4%		2.4%	1.3%		10.8%
SIMAP Modeling	bbl	0.							32		271
Results	Spatial Extent o				Expos	sure over Th	resho	ld (Up to 30	Days After Sp	ill)	
	Wate	Water (Volume) – Eco		ological	Sur	face (Area x	. Days	Exposed)	Shor	eline	(Length)
	Whol (1 n	le Oil ng/l)		ssolved 01 mg/l)		cological 10 g/m ²)		cioeconomic 0.01 g/m ²)	Ecologica (100 g/m ²		Socioeconomic (1 g/m ²)
				8 mil gal		mi ² -days		7 mi ² -days	5 mi		34 mi
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)									
	Be	drock	ι	Unconsolida Rock	ated	Sand	Beach	Mu	d or Timber	A	Artificial Shore
	1.5	51 mi		2.45 mi		0 mi			0.1 mi	0 mi	
		Bra	ckish/E	stuarine W	Vetland Habitats Exposed (l (Miles over	• Ecological Th	resh	old)
Ecological Shoreline	Salt	marsh	U	pper Inter	tidal	Lower In			hragmites		hrub/Scrub and
Exposures	0	.1 mi		Mix 0 mi		M 0 1			Wetland 0.52 mi	F	orested Wetland 0 mi
	0.		Freebur	-	nd Ual	-		ilos over Fe	ological Thresh	old)	0 111
			T	pper Inter		Lower I			hragmites		hrub/Scrub and
	Catta	il Marsh		Mix	tiuai	M			Wetland		prested Wetland
	0) mi		0 mi		0 1	ni		0 mi		0 mi
			Poten	tial Socioed	conomi	c Impacts fi	rom Sj	pill and Res	ponse Operatio	ons	
Socioeconomic Impacts	would be estate wo areas mo shorefron from Sto intakes th	e oiled ab ould be af ore heavil nt real est oney Poin hat may b	ove the l ffected b y oiled (tate would t to Have be affected	level of con y oil, includ about 5 mild ld be most a erstraw. Add ed include:	cern fo ling res es). Riv affected ditional Charles	r socioecono idue and odo verside parks on the west impacts ma point Mile	omic ef or. SCA , marin shore y be ex 43; Ind	ffects; shoref AT operation nas, beaches, from Peeksk xperienced ir dian Point M	s and cleanup v industry, comr ill to Ossining,	eache vould nercia and c ong ti versti	s, parks, and real l be focused on al property, and on the east shore he river. Water raw Mile 38.

Bear Mountain 2,500-bbl Home Heating Oil Spill (Spring-Low Tide) Effects

			R	esponse Equipment	t and Plan Activati	on	-	-	
	NCP and		Tier I	Response Requirem	ents	G		Ss Activated ays)	
	USCG Type	Tier 1 (2	4 hrs)	Tier 2	Tier 3	Rail	Miles	River Miles	
	Major MMPD	4,000 ft bo 1,000 ft + 3 skimming s 1,200 bbl/c 2,400 bbl s	300 per system lay	n/a	n/a	n/a		7 river miles Mile 44-37 2016-81 to 2016-87	
]	Response	Overview: Expecte	ed Outcomes and O	Challenge	s		
G	Protective B	Booming	Mech	anical Recovery	Shoreline Clea	anup	Oth	er Challenges	
Spill Response	High currents a 0.7 kt s will rec effectiveness, containment an diversionary bo configurations angled to preve entrainment and over; exclusion deflection confi to be used to pr sensitive areas.	d d bom to be ent d splash and igurations rotect	rapid sp reduce a recover mobiliz propelle up shor boom a	aporation and preading will amount that can be ed mechanically; e floating self- ed skimmers; set eline containment reas with vacuum- ind skimmers.	About >1% is anti to cause shoreline contamination. Pe SCAT; wetland fli some substrate rer due to penetration sandy beaches; oil structures; oiled d removal.	rform ushing; noval on led dock	challeng wetlands may cau potentia entrainm column intake au concerns areas ne to dilutio	d access may be e; disturbance of s during response se effects; l for $>5\%$ nent in water may lead to water md fish kill s especially in ar spill site prior on; perform water tracking, and air	

Bear Mountain 2,500-bbl Home Heating Oil Spill (Spring-Low Tide) Response

						•						
Scenario	Loca		ource	V	olume	(Oil Type	Season		Tide Stage		
Description	Bear Mo Bric		сс	anker Illision vessel	2,	500 bbl	Но	ome heating oil	Summer		High	
Spill		Annı	ial Prob	ability Any	where	in Hudson	River				ual Frequency 2015)	
Probability	Spi	ill of Typ	e (Any '	Volume)	S	pill of Type	and V	olume	US		Hudson	
-		0.7	732			0.0)24		0.58		0	
Conditions	Lat/I		Relea	ase Rate	Da	Release ate/Time	Model Run Duration		Winds		Water Temperature	
Conditions	41.32 -73.98		Insta	ntaneous		August 4:00pm		30 days	SW / light (<4 kts)	t	81°F	
				Mass B	alance		lodel	Run (After 3	0 Days)			
	Fate	Surf	ace	Atmosph	nere	Water Column	L	Sediment	Ashor	e	Degraded	
	%	0.00	2%	73.8%	6	3.6%		0.1%	20.0%	2	2.6%	
SIMAP Modeling	bbl	0.0)4	1,846	5	89		2	499		64	
Results			Spatia	al Extent of	Expos	sure over Th	resho	old (Up to 30	Days After Sp	ill)		
	Water	r (Volum	e) – Eco	ological	Sur	face (Area x	Days	s Exposed)	Shor	eline	(Length)	
	Whol (1 n			ssolved 01 mg/l)	Ecological (10 g/m ²)		Socioeconomic (0.01 g/m ²)				Socioeconomic (1 g/m ²)	
	26 mi			6 mil gal		ni ² -days		l mi ² -days	17 mi		49 mi	
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
	Be	drock	ι	Unconsolida Rock	ated	Sand 1	Beach	n Muo	l or Timber	A	Artificial Shore	
	3.	6 mi		11 mi	0 n		mi		1.8 mi		0 mi	
		Bra	ckish/E	stuarine W	etland	Habitats Ex	posed	d (Miles over	Ecological Th	resh	old)	
Ecological Shoreline	Salt	marsh	U	pper Inter	tidal	Lower In			ragmites		hrub/Scrub and	
Exposures) mi		Mix 0.2 mi		M 0.2			Wetland 0 mi	Fo	orested Wetland 0 mi	
	(Freehw		nd Hal			lilos ovor Foo	logical Thresh	old)	0 111	
	~			pper Inter		Lower I			ragmites		hrub/Scrub and	
	Catta	il Marsh	Ĩ	Mix		M			Wetland		prested Wetland	
	0) mi		0 mi		0 1	ni		0 mi		0 mi	
									oonse Operatio			
Socioeconomic Impacts	Response operations may cause som would be oiled above the level of co estate would be affected by oil, inclu areas more heavily oiled (about 17 r shorefront real estate would be most from Stoney Point to Haverstraw. A intakes that may be affected include				cern fo ling res iles). R affected ditional Charles	r socioecono idue and odo iverside park l on the west l impacts ma s Point Mile	mic effor. SC. as, man shore y be eff 43; Ind	ffects; shorefi AT operation rinas, beaches from Peeksk xperienced in dian Point Mi	ont marinas, be s and cleanup v , industry, com ill to Ossining, other towns al	eache vould merc and c ong the verst	s, parks, and real be focused on ial property, and on the east shore he river. Water raw Mile 38.	

Bear Mountain 2,500-bbl Home Heating Oil Spill (Summer-High Tide) Effects

Bear Mountain 2,500-bbl Home Heating Oil Spill (Summer-High Tide) Response

]	Response Equipmer	t and Plan Activa	tion			
	NCP and		Tier	Response Requirem	ents	GI		Ss Activated lays)	
	USCG Type	Tier 1 (24	4 hrs)	Tier 2	Tier 3	Rail N	Ailes	River Miles	
	Major MMPD	4,000 ft bo 1,000 ft + 3 skimming s 1,200 bbl/d 2,400 bbl s	300 per system lay	n/a	n/a	n/	a	7 river miles Mile 44-37 2016-81 to 2016-87	
		J	Respons	se Overview: Expect	ted Outcomes and	Challenge	s		
	Protective B	ooming	Mec	hanical Recovery	Shoreline Cl	eanup	Otł	ner Challenges	
Spill Response	High currents a	veraging		vaporation and	About 20% is an	ticipated	Wetland access may be		
	0.7 kt s will red	luce boom		spreading will	to cause shorelin			ge; disturbance of	
	effectiveness,			e amount that can be	contamination. F		wetlands during respons		
	containment an			ered mechanically;	SCAT; wetland	0,	-	use effects;	
	diversionary bo			ize floating self-	some substrate r		-	al for $<4\%$	
	configurations			led skimmers; set	due to penetratio			ment in water	
	angled to preve entrainment and			oreline containment areas with vacuum-	sandy beaches; oiled dock structures; oiled debris			may lead to water and fish kill	
	over; exclusion			and skimmers.				is especially in	
deflection configu			in dents					ear spill site prior	
	to be used to pr							ion; perform water	
	sensitive areas.							tracking, and air	
							monito	-	

						-		<u> </u>			,	
Seconomio	Loca	tion		ource	V	olume		Oil Ty	ре	Season		Tide Stage
Scenario Description	Bear Mo Bric		со	anker Illision vessel	2,	500 bbl	Но	ome he oil	ating	Summer		Low
Spill		Annu	ial Prob	ability Any	where	in Hudson I	Rivei	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any V	Volume)	S	oill of Type	and V	Volum	e	US		Hudson
-		0.7	732			0.0)24			0.58		0
Conditions	Lat/I		Relea	ase Rate	Release Date/Time		Model Run Duration			Winds		Water Temperature
	41.32 -73.98		Insta	ntaneous		igust 2012 :00am		30 day	'S	SW / ligh (<4 kts)	t	81°F
				Mass B	alance	at End of M	Model Run (After 3			Days)		
	Fate	Surf	ace	Atmosph	nere	Water Column	l	Sec	liment	Ashor	e	Degraded
	%	0.000)4%	70.1%	b	7.2%		0	0.1%	18.9%		3.6%
SIMAP Modeling	bbl	0.0)1	1,754	Ļ	179			3	474		90
Results			Spatia	al Extent of	of Exposure over Th			old (Uj	p to 30 D	ays After Spi	ll)	
	Wate	r (Volum	e) – Eco	ological	Sur	face (Area x	. Day	s Expo	osed)	Shore	eline	(Length)
		le Oil		ssolved		cological 10 g/m ²)	Socioeconomi (0.01 g/m ²)		onomic Ecologic			Socioeconomic (1 g/m ²)
					$\frac{10 \text{ g/m}}{\text{mi}^2\text{-days}}$ 7 mi ² -da			16 mi	,	41 mi		
	2,000 1	Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
	Be	drock		J nconsolid a	•	Sand I				or Timber	-	Artificial Shore
	4	.9 mi		Rock					0	0.5 mi		0 mi
	т.	-	okish/Fa		otland	Habitats Ex		d (Mil				-
Ecological				pper Inter		Lower Ir	-			agmites		hrub/Scrub and
Shoreline Exposures	Salt	tmarsh	U	Mix	illai	M		luai		etland		prested Wetland
Exposures	C) mi		0 mi		0 r	ni			0 mi		0 mi
			Freshwa	ater Wetla	nd Hal	oitats Expos	ed (N	/liles ov	ver Ecolo	gical Thresh	old)	
	Cattail MarshUpper Intertidal MixLower Intertidal MixPhragmi Wetlan										hrub/Scrub and prested Wetland	
	0 mi 0 mi 0 mi 0							0 mi		0 mi		
			Poten	tial Socioec	onomi	c Impacts fr	com S	Spill ar	nd Respo	nse Operatio	ns	
Socioeconomic Impacts	would be estate wo areas mo shorefrom from Sto intakes th	e oiled ab ould be af ore heavil nt real est oney Poin hat may b	ove the l fected b y oiled (a ate would t to Have be affected	level of con- y oil, includ about 16 mi ld be most a erstraw. Add ed include: (cern fo ling res les). R iffected ditional Charles	r socioecono idue and odo iverside park on the west impacts may Point Mile 4	mic e or. SC s, ma shore y be e 43; In	effects; CAT op arinas, l e from experie adian P	shorefrom erations a beaches, Peekskill nced in o oint Mile	nt marinas, be and cleanup w industry, comm to Ossining, a	ache ould merc and c ong th versti	

Bear Mountain 2,500-bbl Home Heating Oil Spill (Summer-Low Tide) Effects

Bear Mountain 2,500-bbl Home Heating Oil Spill (Summer-Low Tide) Response

			ŀ	Response Equipmen	t and Plan Activati	on			
	NCP and		Tier	Response Requiren	nents	G		Ss Activated ays)	
	USCG Type	Tier 1 (24	4 hrs)	Tier 2	Tier 3	Rail	Miles	River Miles	
	Major MMPD	4,000 ft bo 1,000 ft + 3 skimming s 1,200 bbl/d 2,400 bbl s	300 per system lay	n/a	n/a	n	/a	7 river miles Mile 44-37 2016-81 to 2016-87	
		J	Respons	e Overview: Expect	ed Outcomes and O	Challenge	s		
	Protective B	ooming	Mec	hanical Recovery	Shoreline Cleanup		Other Challenges		
Spill Response	High currents a	veraging		vaporation and	About 19% is anti	cipated	Wetland access may be		
	0.7 kt s will redu			preading will	to cause shoreline		-	ge; disturbance of	
	effectiveness,		reduce amount that can be		contamination. Pe			s during response	
	containment an			red mechanically;	SCAT; wetland fl	0,	•	ise effects;	
	diversionary bo		mobilize floating self- propelled skimmers; set		some substrate ren		-	l for >7% nent in water	
	configurations angled to preve			reline containment	due to penetration sandy beaches; oil			may lead to water	
	entrainment and			areas with vacuum-			2		
	over; exclusion and deflection configurations		trucks	and skimmers.	removal. concerns especia		s especially in		
							areas ne	ar spill site prior	
	to be used to pr							on; perform water	
	sensitive areas.							tracking, and air	
							monitor	ing.	

						•		<u> </u>				
Scenario	Loca	tion		ource	V	olume		Oil Ty	ре	Season		Tide Stage
Description	Bear Mo Bric		co	anker ollision vessel	2,	500 bbl	Но	ome he oil	ating	Winter		High
Spill		Annı	ıal Prob	ability Any	where	in Hudson	Rive	r		Historical (2	Annı 2000-2	ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	SI	oill of Type	and V	Volume	e	US		Hudson
·		0.7	732			0.0)24			0.58		0
Conditions	Lat/		Relea	ase Rate	Da	elease te/Time	Model Run Duration		on	Winds		Water Temperature
Conditions	41.32 -73.98		Instan	taneous	8	1 January 2012 8:00am 30 days		s	South / moder (4-18 kts)	rate	34°F	
				Mass B	alance		Model Run (After 3			Days)		1
	Fate	Surf	ace	Atmosph	nere	Water Column	l	Sed	liment	Ashore	e	Degraded
	%	0.00	5% 65.9% 6.8% 0.5%				.5%	19.4%		6.9%		
SIMAP Modeling	bbl	0.1							485		172	
Results	Spatial Extent			al Extent of	Expos	ure over Th	resh	old (Uj	o to 30 D	ays After Spi	ill)	
	Wate	Water (Volume) – Eco		ological	Sur	face (Area x	Day	s Expo	sed)	Shore	eline	(Length)
	Whol (1 n	le Oil ng/l)		ssolved 01 mg/l)		cological 0 g/m ²)				Ecologica (100 g/m ²		Socioeconomic (1 g/m ²)
				5 mil gal	1.6	mi ² -days	2.	.5 mi ² -c	lays	26 mi		48 mi
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
	Be	drock	τ	Unconsolidated Rock		Sand 1	Beacl	h	Mud	or Timber	A	Artificial Shore
	5.	.5 mi		18.3 mi		0 mi		1.		.6 mi	0 mi	
Faclosical		Bra	ckish/E	stuarine W	vetland Habitats Exposed (Miles over			es over H	Ecological Th	resho	old)	
Ecological Shoreline Exposures	Salt	tmarsh	U	pper Inter Mix	er Intertidal Lower Mix			idal		Phragmites Wetland		nrub/Scrub and prested Wetland
Exposures	0.	.2 mi		0.2 mi		0 1	ni		().1 mi		0 mi
			Freshw	ater Wetla	nd Hab	oitats Expos	ed (N	Ailes ov	ver Ecol	ogical Thresh	old)	
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		nrub/Scrub and prested Wetland
	C) mi		0 mi		0 1	ni			0 mi		0 mi
			Poten	tial Socioed	conomi	c Impacts fi	rom S	Spill ar	d Respo	onse Operatio	ns	
Socioeconomic Impacts	would be estate wo areas mo shorefrom from Sto intakes th	e oiled ab ould be af ore heavil nt real est oney Poin hat may b	ove the l ffected b y oiled (ate would t to Have be affected	level of con y oil, includ about 26 mi ld be most a erstraw. Add ed include: (cern for ling res iles). Ri affected ditional Charles	r socioecono idue and odo iverside park on the west impacts ma Point Mile	omic e or. SC s, ma shore y be e 42; Ir	effects; CAT op arinas, l e from 2 experie adian Po	shorefro erations peaches, Peekskill nced in c oint Mile	nt marinas, be and cleanup w industry, com to Ossining, a	aches ould merci and o ong th verstr	

Bear Mountain 2,500-bbl Home Heating Oil Spill (Winter-High Tide) Effects

			ŀ	Response Equipmen	t and Plan Activati	on		-
	NCP and		Tier	Response Requiren	nents	G		Ss Activated ays)
	USCG Type	Tier 1 (24	4 hrs)	Tier 2	Tier 3	Rail	Miles	River Miles
	Major MMPD	4,000 ft bo 1,000 ft + 3 skimming s 1,200 bbl/c 2,400 bbl s	300 per system lay	n/a	n/a	n	/a	7 river miles Mile 44-37 2016-81 to 2016-87
]	Respons	e Overview: Expect	ed Outcomes and O	Challenge	es	
	Protective B	looming	Mec	hanical Recovery	Shoreline Clea	anup	Oth	er Challenges
Spill Response	High currents a 0.7 kt s will rec effectiveness, containment an diversionary be configurations angled to preve entrainment an over; exclusion deflection conf to be used to pr sensitive areas, ice conditions n boom deploym	d bom to be ent d splash and igurations otect Potential nay affect	rapid s reduce recove mobili propell up sho boom a trucks Potenti may af	vaporation and preading will amount that can be red mechanically; ze floating self- led skimmers; set reline containment areas with vacuum- and skimmers. ial ice conditions fect mechanical ry operations.	About 19% is anti to cause shoreline contamination. Pe SCAT; wetland fl some substrate rer due to penetration sandy beaches; oil structures; oiled d removal.	rform ushing; noval on led dock	challeng wetland: may cau potentia entrainm column intake au concern areas ne to dilutio	d access may be ge; disturbance of s during response ise effects; l for 7% ment in water may lead to water nd fish kill s especially in ar spill site prior on; perform water tracking, and air ing.

Bear Mountain 2,500-bbl Home Heating Oil Spill (Winter-High Tide) Response

						•		<u>`</u>		Season	<u> </u>	
Scenario	Loca	uon		ource anker	V	olume		Oil Ty	pe	Season		Tide Stage
Description	Bear Mo Bric		co	anker ollision n vessel	2,	500 bbl	Ho	ome he oil	ating	Winter		Low
Spill		Annu	ial Prob	ability Any	where	in Hudson	Rive	r		Historical (2	Annı 000-2	ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	Sp	oill of Type	and V	Volume	e	US		Hudson
		0.7	32			0.0)24			0.58		0
Conditions	Lat/I		Relea	ase Rate	Da	elease te/Time	Model Run Duration			Winds		Water Temperature
Conditions	41.32 -73.98		Insta	ntaneous		uary 2012 :30am		30 day	ys	South / moder (4-18 kts)	ate	34°F
				Mass B	alance	at End of N	lodel	Run (After 30	Days)		
	Fate	Surf	ace	Atmosph	nere	Water Column	ı	Sed	liment	Ashore	•	Degraded
	%	0.1	%	66.0%	6	7.4%		0	0.6%	17.6%		7.4%
SIMAP Modeling	bbl	1.	4 1,649 185						14	441		186
Results			Spatia	al Extent of	Expos	ure over Th	resh	old (Uj	p to 30 I	Days After Spi	ll)	
	Wate	r (Volum	e) – Eco	ological	Sur	face (Area x	. Day	s Expo	sed)	Shore	eline	(Length)
		le Oil		ssolved		cological	Socioeconomic			Ecologica		Socioeconomic
	(1 m	0 .		01 mg/l)		$\frac{10 \text{ g/m}^2}{\text{mi}^2 \text{ dava}}$	(0.01 g/m²) 3.6 mi ² -days			(100 g/m²) 27 mi)	(1 g/m ²) 56 mi
	7,7071	87 mil gal 9,387 mil gal 2.4 mi ² -days 3.6 mi ² -days 27 mi 56 mi Shoreline Exposure by Shore Type (Miles over Ecological Threshold)									50 III	
				Unconsolida	•		· · ·			·	-	
	Be	drock		Rock	Sand F		Beach Mud		Mud	Mud or Timber		rtificial Shore
	5.	.3 mi		18.8 mi		0 1	mi		2.4 mi			0 mi
Faclasian		Bra	ckish/E	stuarine W	etland	Habitats Ex	xpose	ed (Mil	es over]	Ecological Th	resho	old)
Ecological Shoreline	Salt	tmarsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		rub/Scrub and rested Wetland
Exposures	0.	.3 mi		0.3 mi		0 1	mi			0.1 mi		0 mi
			Freshw	ater Wetla	nd Hab	itats Expos	ed (N	Ailes ov	ver Ecol	ogical Thresh	old)	
	Cattali March 11								rub/Scrub and rested Wetland			
	0 mi 0 mi 0 mi 0 mi								0 mi			
			Poten	tial Socioed	conomi	c Impacts fi	rom S	Spill ar	nd Resp	onse Operatio	ns	
Socioeconomic Impacts	would be estate wo areas mo shorefrom from Sto intakes th	e oiled ab ould be af ore heavily nt real est oney Point hat may b	level of con y oil, includ about 27 mi ld be most a erstraw. Add ed include:	cern for ling res iles). Ri affected ditional Charles	r socioecono idue and odo iverside park on the west impacts ma Point Mile	omic e or. SC s, ma shore y be e 43; Ir	effects; CAT op arinas, l e from experie ndian Po	shorefro erations beaches, Peekskil nced in oint Mile	and cleanup w industry, com l to Ossining, a	aches ould nerci and o ong th verstr	s, parks, and real be focused on al property, and n the east shore he river. Water aw Mile 38.	

Bear Mountain 2,500-bbl Home Heating Oil Spill (Winter-Low Tide) Effects

			I	Response Equipmen	t and Plan Activati			-	
	NCP and		Tier	Response Requiren	ients	G		Ss Activated lays)	
	USCG Type	Tier 1 (24	4 hrs)	Tier 2	Tier 3	Rail	Miles	River Miles	
	Major MMPD	4,000 ft bo 1,000 ft + 3 skimming s 1,200 bbl/c 2,400 bbl s	300 per system lay	n/a	n/a	n	/a	7 river miles Mile 44-37 2016-81 to 2016-87	
]	Respons	e Overview: Expect	ed Outcomes and O	Challenge	s		
	Protective B	Booming	Mec	hanical Recovery	Shoreline Cle	anup	nup Other Chal		
Spill Response	High currents a 0.7 kt s will rec effectiveness, containment an diversionary bc configurations angled to preve entrainment an over; exclusion deflection confi to be used to pr sensitive areas, ice conditions n boom deploym	duce boom doom to be ent d splash and igurations rotect Potential may affect	rapid s reduce recove mobili propell up sho boom a trucks Potenti may af	vaporation and preading will amount that can be red mechanically; ze floating self- led skimmers; set reline containment areas with vacuum- and skimmers. ial ice conditions fect mechanical ry operations.	About 18% is anti to cause shoreline contamination. Pe SCAT; wetland fl some substrate ren due to penetration sandy beaches; oi structures; oiled d removal.	erform ushing; noval on led dock	challeng wetland may cau potentia entrainm column intake a concern areas ne to diluti	d access may be ge; disturbance of s during response ise effects; 1 for $>7\%$ ment in water may lead to water nd fish kill s especially in ar spill site prior on; perform water tracking, and air ing.	

Bear Mountain 2,500-bbl Home Heating Oil Spill (Winter-Low Tide) Response

Iona Island Crude-by-Rail 11,000-bbl Bakken Crude Spill

Iona Island CBR 11,000-bbl Bakken Crude Spill (Spring-High Tide) Effects

Scenario	Loca	tion	So	ource	V	olume	-	Oil Ty	pe	Season	-	Tide Stage
Description	Iona I	sland	CBR t	train spill	11	,000 bbl	Ba	akken c	crude	Spring		High
Spill		Annu	al Prob	ability Any	where	in Hudson	Rive	er				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any '	Volume)	S]	pill of Type	and	Volum	ne	US		Hudson
		0.000	00046			0.000				0.2		0
	Lat/		Release Rate		Release Date/Time			1odel I Durati		Winds		Water Temperature
Conditions	41.31 -73.9 41.30 -73.9	8598)628	Instan	taneous		april 2012 2:00am	30 days		ys	SW / light (<4 kts)		45°F
				Mass Ba	alance	at End of M	lodel	Run (After 30	Days)		
	Fate	Surf	face	Atmospl	here	Water Colum	ı	Sec	diment	Ashor	e	Degraded
	%	0.0	%	50.6%	%	6.8%		4	5.4%	8.2%		4.5%
SIMAP	bbl	C)	5,563	3	751			598	898		498
Modeling Results	Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill)											
	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)										-	
	Who (1 n	le Oil ng/l)		ssolved 01 mg/l)	(1	cological l0 g/m²)		cioeco (0.01 g	$/m^2$)	Ecological (100 g/m ²)		Socioeconomic (1 g/m ²)
	49,340	mil gal	12,78	1 mil gal	11	mi ² -days	1	7 mi ² -c	lays	32 mi		112 mi
			Shoreline Exposure by Shore Type (Miles over Ecolo					r Ecolog	ical Thresho	ld)		
	Be	drock	τ	Jnconsolida Rock	ated	Sand	Beac	h	Mud	or Timber	A	rtificial Shore
	5.	.5 mi		21.5 mi	0.1 mi			3	3.1 mi		0 mi	
Ecological		Brac					-		iles over Ecological Tl			
Shoreline Exposures	Salt	marsh	U	pper Inter Mix			Intertidal ⁄Iix			agmites etland	Shrub/Scrub and Forested Wetland	
P	0.	4 mi		0.2 mi		0	mi]	.4 mi		0 mi
		ŀ								ogical Thres		
		il Marsh	U	pper Inter Mix	tidal	Lower In M	lix	idal	W	agmites etland		rub/Scrub and rested Wetland
	0 mi 0 mi 0 mi 0 mi									0 mi		
	Potential Socioeconomic Impacts from Spill and Response Operations											
	Response operations may cause some impacts to vessel traffic along river for a few days; evacuations and precautionary clearance zones might cause further impacts to vessel traffic. Evacuation of populated areas could cause effects on communities and businesses. Freight rail traffic may be affected for a few days until the derailed and/or burned train cars are removed. 112 miles of shoreline would be oiled above the level of										ulated areas ew days until the e level of	
Socioeconomic Impacts	oil, inclu (about 3 would b Peekskil that may Additior	iding resi 2 miles). e most af l to Yonk be affec	due and Riversic fected of cers. Add ted inclu	odor. SCA le parks, ma n the west s ditional imp ide: Charles	T oper arinas, shore fi pacts m s Point	ations and c beaches, inc com Stony P nay be exper Mile 43; Inc	leanu lustry oint t ience dian l	p woul , comr o Alpin d in oth Point M	ld be foc nercial p ne, New her town file 42; V	used on areas roperty, and s	more shore n the ver. V aw N	1ile 38.

Iona Island CBR 11,000-bbl Bakken Crude Spill (Spring-High Tide) Response

			Re	sponse Equipment	t and Plan Activat	ion		
	NCP and		Tier l	Response Require	ments	Gl		Ss Activated ays)
	USCG Type	Tieı	r 1	Tier 2	Tier 3	Rail	Miles	River Miles
	Major Not defined	No requi	rement	No requirement	No requirement	2 rail miles QR-40 to QR42		26 river miles Mile 44-18 2016-81 to 2016-100
		Re	esponse (Overview: Expected	ed Outcomes and	Challeng	es	
	Protective Boo	oming	Mecha	anical Recovery	Shoreline Clea	anup	Oth	er Challenges
Spill Response ²³	Protective Booming Average river currents of 1 kt will reduce boom Spill			aporation and reading will amount that can vered ically; mobilize self-propelled rs; set up e containment reas with -trucks and rs.	About 8% is antic Tappan Zee to car shoreline contami Perform SCAT; v flushing; some su removal due to penetration on san beaches; oiled do structures; oiled do removal.	use nation. vetland bstrate ndy ck	Bakken significa high ber area aro wetland challeng wetland may cau potentia of 7% in leading and fish especial the spill dilution	bility during a spill is a ant danger, as are nzene vapors in und the spill; access may be ge; disturbance of s during response use effects; l for entrainment n water column to water intake kill concerns ly in areas near site prior to ; perform water tracking, and air

²³ At this time, there is no federal regulatory requirement for any specific contracted tiered response resource requirement. This does not mean that no response will take place.

Scenario	Loca	tion	So	ource	V	olume		Oil Ty	ре	Season		Tide Stage	
Description	Iona I	sland	CBR	rain spill	11	,000 bbl	Ba	ıkken c	rude	Spring		Low	
Spill		Annu	al Prob	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)	
Probability	Spi	ll of Typ	e (Any '	Volume)	$\mathbf{S}_{\mathbf{I}}$	pill of Type	and	Volum	ie	US		Hudson	
		0.000	00046			0.000				0.2		0	
	Lat/	Lon	Relea	ase Rate		lelease te/Time		Iodel H Durati		Winds		Water Temperature	
Conditions	41.31 -73.99 41.30 -73.99	8598)628	Instar	ntaneous		April 2012 9:00am		30 day	s	SW / light (<4 kts)		45°F	
				Mass Ba	alance	at End of M	Iodel	Run (After 30	Days)			
	Fate	Surf	face	Atmosp	here	Water Columr	1	Sec	liment	Ashor	e	Degraded	
	%	0.0	%	42.39	6	6.1%		3	9.2%	1.3%		4.4%	
SIMAP Modeling	bbl	C)	4,655	5	674		4	,311	140		489	
Results	Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill)												
	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)											-	
	Who (1 n	le Oil 1g/l)		ssolved 01 mg/l)		cological l0 g/m ²)	Socioeconomic (0.01 g/m ²)			Ecologica (100 g/m ²)		Socioeconomic (1 g/m ²)	
	8,691 r	nil gal	26,26	$\frac{1}{2}$ (10 g m) (10 g m) (000 r g m) (ays	6 mi 24 mi			
				-		Shore Type	(Mi	les ove	r Ecolog	logical Threshold)			
	Be	drock	ι	Jnconsolid Rock	ated	Sand	Beac	h	Mud	or Timber	A	artificial Shore	
	1	mi		2.9 mi		0 1	0 mi			0.5 mi		0 mi	
Ecological		Brac					-			Ecological Th		-	
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		nrub/Scrub and prested Wetland	
Exposures	0.	2 mi		0 mi		0 1	mi		1.4 mi			0 mi	
		ŀ								ogical Thresl			
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		nrub/Scrub and prested Wetland	
	0) mi		0 mi		0 1				0 mi		0 mi	
								-	-	onse Operatio			
Socioeconomic Impacts	precautic could ca derailed for socio includin (about 6 would b Peekskil intakes t Additior	onary cle use effec and/or bu beconomi g residue miles). F e most af l to Croto hat may l	arance z ts on con urned tra c effects and odc Riverside fected of pon Point. be affect itionary	ones might mmunities a in cars are s; shorefrom or. SCAT of e parks, main n the west s . Additiona ed include:	cause and bus remove t marin peratio rinas, b shore fi l impac Charle	further impa sinesses. Fre ed. 24 miles has, beaches, ns and clean beaches, indu com Stony P cts may be ex- es Point Mile	icts to ight i of sh park up wo istry, oint t xperic e 43;	o vessel rail traf oreline s, and ould be commo o Have enced i Indian	I traffic. fic may would I real estate focused ercial pr erstraw, a n other t Point M	be oiled above e would be at on areas more operty, and sh and on the eas owns along the	f pop r a fe e the ffecte re he lorefi t sho ne riv Have	ulated areas ew days until the level of concern ed by oil, avily oiled ront real estate ore from ver. Water rstraw Mile 38.	

Iona Island CBR 11,000-bbl Bakken Crude Spill (Spring-Low Tide) Effects

Iona Island CBR 11,000-bbl Bakken Crude Spill (Spring-Low Tide) Response

			Re	sponse Equipment	t and Plan Activat	ion		
	NCP and		Tier l	Response Require	ments	GI	RPs/ GRS (7 d	Ss Activated ays)
	USCG Type	Tie	r 1	Tier 2	Tier 3	Rail	Miles	River Miles
	Major Not defined	No requ	irement	No requirement	No requirement		miles to QR42	4 river miles Mile 44-40 2016-81 to 2016-84
		R	esponse	Overview: Expect	ed Outcomes and	Challeng	es	
	Protective Boo	oming	Mecha	anical Recovery	Shoreline Cle	anup	Othe	er Challenges
Spill Response ²⁴	Average river cur 1 kt will reduce b effectiveness, containment and diversionary bood configurations to angled to prevent entrainment and so over; exclusion and deflection configuration to be used to prot sensitive areas.	oom n be splash nd urations	rapid sp reduce a be recov mechan floating skimme shorelin boom at	ically; mobilize self-propelled rs; set up te containment reas with -trucks and	About 1% is antic to cause shoreline contamination wh may result in lim shoreline cleanup operations. Perfo SCAT; wetland f some substrate re due to penetration sandy beaches; of dock structures; of debris removal.	e nich ited rm lushing; moval n on iled	Bakken significa high ber area aro wetland challeng wetland may cau potentia of 6% ir leading and fish especial the spill dilution	bility during a spill is a ant danger, as are izene vapors in und the spill; access may be ge; disturbance of s during response use effects; l for entrainment n water column to water intake kill concerns ly in areas near site prior to ; perform water tracking, and air

²⁴ At this time, there is no federal regulatory requirement for any specific contracted tiered response resource requirement. This does not mean that no response will take place.

Scenario	Loca	-		ource		olume	· ·	Oil Ty		Season		Tide Stage	
Description	Iona I	sland	CBR t	rain spill	11	,000 bbl	Ва	akken o	crude	Summer		High	
Spill		Annu	al Proba	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)	
Probability	Spi	ll of Typ	e (Any V	Volume)	S	pill of Type	and	Volun	ne	US		Hudson	
		0.000	00046			0.000	0003	5		0.2		0	
	Lat/		Relea	nse Rate		elease te/Time		1odel 1 Durati		Winds		Water Temperature	
Conditions	41.31 -73.99 41.30 -73.99	8598)628	Instanta	aneous		ıgust 2012 1:00pm		30 da <u>y</u>	ys	SW / light (<4 kts)		81°F	
				Mass Ba	alance	at End of M	lodel	Run (Run (After 30 Days)				
	Fate	Surf	face	Atmosp	here	Water Columr	1	Se	diment	Ashor	e	Degraded	
	%	0.0	%	53.0%	%	31.5%		(0.3%	12.1%	2	3.0%	
SIMAP	bbl	С)	5,832	2	3,467			36	1,334		331	
Modeling Results	Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill)												
	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length												
	Whol (1 n	le Oil 1g/l)		ssolved 01 mg/l)		cological 0 g/m ²)		cioeco (0.01 g	nomic g/m ²)	Ecologica (100 g/m ²		Socioeconomic (1 g/m ²)	
	50,800	mil gal	55,20	55,203 mil gal 19 mi ² -days 19 mi ² -days					days	33 mi 40 mi			
				eline Exposure by Shore Type (Miles over Ecol					er Ecolog	gical Thresho	ld)		
	Be	drock	ι	Jnconsolid Rock	ated	Sand 1	Beac	h	Mud	or Timber	A	rtificial Shore	
	6.	3 mi		20.1 mi	0 mi				5.9 mi		0 mi		
Ecological		Brac					-			Ecological Th			
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites /etland		rub/Scrub and rested Wetland	
Exposures	0.	1 mi		0.2 mi		0.2	mi		().2 mi	2 mi 0 mi		
		ŀ								logical Thres			
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites /etland		rub/Scrub and rested Wetland	
	() mi		0 mi		0 1				0 mi		0 mi	
						=		-		onse Operati			
Socioeconomic Impacts	precautic could ca derailed for socio includin (about 3 would be Philipsto intakes t Additior	onary cle use effec and/or bu beconomi g residue 3 miles). e most af own to Cr hat may b	arance z ts on con urned tra c effects and odo Riversic fected on roton Poi co affect utionary	ones might mmunities in cars are s; shorefrom or. SCAT of le parks, m n the west s int. Additioned include:	cause and bus remove t marin peratio arinas, shore fi onal im	further impa sinesses. Fre ed. 40 miles has, beaches, ns and clean beaches, inc rom Highlan pacts may be es Point Mile	icts to ight i of sh park up w lustry ds to e exp e 43;	o vesse rail trai oreling s, and ould be v, comi Haver erience Indian	I traffic. ffic may e would real esta e focused mercial p rstraw, an ed in oth Point M	be oiled above te would be at d on areas more property, and s ad on the east er towns along	f pop or a fe e the ffecte ffecte shore shore shore g the Have	ulated areas ew days until the level of concern ed by oil, avily oiled front real estate e from river. Water rstraw Mile 38.	

Iona Island CBR 11,000-bbl Bakken Crude Spill (Summer-High Tide) Effects

Iona Island CBR 11,000-bbl Bakken Crude Spill (Summer-High Tide) Response

			Re	sponse Equipmen	t and Plan Activat	ion		
	NCP and		Tier l	Response Require	ments	GI	RPs/ GRS (7 d	s Activated ays)
	USCG Type	Tie	er 1	Tier 2	Tier 3	Rail	Miles	River Miles
	Major Not defined	No requ	irement	No requirement	No requirement		miles to QR42	15 river miles Mile 55-40 2016-73 to 2016-84
		R	esponse	Overview: Expect	ed Outcomes and	Challeng	es	
	Protective Boo	oming	Mecha	anical Recovery	Shoreline Cle	anup	Othe	er Challenges
Spill Response ²⁵	Protective Boomi Average river currer 1 kt will reduce boot effectiveness,			aporation and reading will amount that can vered ically; mobilize self-propelled rs; set up te containment reas with -trucks and rs.	About 12% is ant to cause shorelind contamination. Po SCAT; wetland f some substrate re due to penetration sandy beaches; of dock structures; of debris removal.	e erform lushing; moval n on iled	Bakken significa high ber area aro wetland challeng wetland may cau potentia of 32% leading and fish especial the spill dilution	bility during a spill is a ant danger, as are nzene vapors in und the spill; access may be ge; disturbance of s during response use effects; l for entrainment in water column to water intake kill concerns ly in areas near site prior to ; perform water tracking, and air

²⁵ At this time, there is no federal regulatory requirement for any specific contracted tiered response resource requirement. This does not mean that no response will take place.

¹²⁴ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

Scenario	Loca	tion	Sa	ource	V	olume	·	Oil Ty	pe	Season		Tide Stage	
Description	Iona I	sland	CBR t	rain spill	11	,000 bbl	Ва	akken o	crude	Summer		Low	
Spill		Annu	al Proba	ability Any	where	in Hudson	Rive	er				ual Frequency 2015)	
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volun	ne	US		Hudson	
		0.000	0046			0.000				0.2		0	
	Lat/	Lon	Relea	nse Rate		telease te/Time		1odel 1 Durati		Winds		Water Temperature	
Conditions	41.31 -73.98 41.30 -73.98	8598 0628	Instan	itaneous		gust 2012 :00am		30 day	ys	SW / light (<4 kts)		81°F	
				Mass Ba	alance	at End of M	lodel	Run ((After 30) Days)			
	Fate	Surf	ace	Atmosp	here	Water Columr	1	Se	diment	Ashor	e	Degraded	
	%	0.0	%	52.5%	%	32.9%		(0.6%	10.6%	2	3.3%	
SIMAP	bbl	0		5,778	8	3,623			64	1,167		368	
Modeling Results	Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill)												
	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)										-		
	Who (1 n	le Oil 1g/l)		ssolved 01 mg/l)		cological 0 g/m ²)		cioeco (0.01 g	nomic (/m ²)	Ecologica (100 g/m ²		Socioeconomic (1 g/m ²)	
	51,760	mil gal	79,65	0,658 mil gal 17 mi ² -days 17 mi ² -days					days	32 mi 39 mi			
				-	•	Shore Type	(Mi	les ove	r Ecolog	gical Thresho	ld)		
	Be	drock	ι	Jnconsolid Rock	ated	Sand 1	Beac	h	Mud	or Timber	A	rtificial Shore	
	6.	1 mi		19.4 mi		0 mi				5.9 mi		0 mi	
Ecological		Brac					-			Ecological Th			
Shoreline	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites /etland		rub/Scrub and rested Wetland	
Exposures	() mi		0.2 mi		0.2 mi		0.2 mi		0 mi			
		F	reshwa	ter Wetlar	nd Hab	itats Expos	ed (N	Ailes o	ver Ecol	logical Thres	hold)		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites /etland		rub/Scrub and rested Wetland	
	0) mi		0 mi		0 1	mi			0 mi		0 mi	
						-		-	-	onse Operati			
Socioeconomic Impacts	precautic could ca derailed for socio includin (about 3 would be Cortland intakes t Additior	onary clea use effect and/or bu beconomi g residue 2 miles). e most af lt to Croto hat may b	arance z ts on con urned tra c effects and odo Riversic fected on point be affect ttionary	ones might mmunities a in cars are s; shorefron or. SCAT of le parks, m n the west s . Additiona ed include:	cause and bus remove at marin peration arinas, shore fr al impace charle	further impa sinesses. Fre ed. 39 miles has, beaches, ns and clean beaches, inc rom Highlan cts may be e es Point Mile	icts to ight i of sh park up w lustry ds to xperi e 43;	o vesse rail tra- noreline s, and ould be y, com Haver enced Indian	I traffic. ffic may e would real esta e focused mercial p rstraw, ar in other Point M	be oiled above te would be at d on areas more property, and s ad on the east towns along the	f pop or a fe e the ffecte re he shore shore shore riv Have	ulated areas ew days until the level of concern ed by oil, avily oiled front real estate e from northern ver. Water rstraw Mile 38.	

Iona Island CBR 11,000-bbl Bakken Crude Spill (Summer-Low Tide) Effects

Iona Island CBR 11,000-bbl Bakken Crude Spill (Summer-Low Tide) Response

			Re	sponse Equipment	t and Plan Activat	ion		
	NCP and		Tier I	Response Require	ments	GI	RPs/ GRS (7 d	s Activated ays)
	USCG Type	Tie	r 1	Tier 2	Tier 3	Rail	Miles	River Miles
	Major Not defined	No requi	irement	No requirement	No requirement		miles to QR42	12 river miles Mile 50-38 2016-76 to 2016-84
		R	esponse (Overview: Expected	ed Outcomes and	Challeng	es	
	Protective Boo	Protective Booming Mechanical Recovery Shoreline Cle					Othe	er Challenges
Spill Response ²⁶	Average river cun 1 kt will reduce b effectiveness, containment and diversionary bood configurations to angled to prevent entrainment and so over; exclusion and deflection config to be used to prot sensitive areas.	ooom m be splash nd urations	rapid sp reduce a be recov mechani floating skimme shorelin boom at	ically; mobilize self-propelled rs; set up e containment reas with -trucks and	About 11% is ant to cause shorelind contamination. Po SCAT; wetland f some substrate re due to penetration sandy beaches; of dock structures; of debris removal.	e erform lushing; moval n on iled	Bakken significa high ber area aro wetland challeng wetland may cau potentia of 33% leading and fish especial the spill dilution	bility during a spill is a ant danger, as are izene vapors in und the spill; access may be ge; disturbance of s during response ise effects; 1 for entrainment in water column to water intake kill concerns ly in areas near site prior to ; perform water tracking, and air

 $^{^{26}}$ At this time, there is no federal regulatory requirement for any specific contracted tiered response resource requirement. This does not mean that no response will take place.

Scenario	Loca	tion	So	ource	V	olume		Oil Ty	ре	Season		Tide Stage
Description	Iona I	sland	CBR t	train spill	11	,000 bbl	Ва	akken ci	rude	Winter		High
Spill		Annu	al Proba	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volum	e	US		Hudson
		0.000	00046			0.000	0003	5		0.2		0
	Lat/	Lon	Relea	ase Rate		Release ate/Time		Iodel R Duratio		Winds		Water Temperature
Conditions	41.31 -73.92 41.30 -73.92	8598)628	Instan	taneous		nuary 2012 3:00am		30 day	'S	South / moder (4-18 kts)	ate	34°F
				Mass Ba	ss Balance at End of Model Run (Afte				After 3	0 Days)		
	Fate	Surf	face	Atmosp	here	Water Columr	1	Sed	liment	Ashor	e	Degraded
	%	0.0	%	50.49	6	21.7%		3	.6%	16.7%	, 2	6.6%
SIMAP Modeling	bbl	1		5,541	l	2,389		(°.)	394	1,835	í	724
Modeling Results	Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill)											
	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)										-	
	Who (1 n	le Oil 1g/l)		ssolved 01 mg/l)	(1	cological l0 g/m ²)		cioecon (0.01 g/		Ecologica (100 g/m ²)		Socioeconomic (1 g/m ²)
	34,964	mil gal	10,87	.874 mil gal 10 mi ² -days 11 mi ² -days					ays	49 mi		70 mi
				-		Shore Type	(Mi	les over	r Ecolo	gical Thresho	ld)	
	Be	drock	ι	Jnconsolid Rock	ated	Sand	Beac	h	Mud	or Timber	A	rtificial Shore
	8.	3 mi		33.2 mi	3.2 mi 0.2 mi				5.2 mi		0 mi	
Ecological		Brac					-			Ecological Th		
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		rub/Scrub and rested Wetland
Exposures	0.	2 mi		0.8 mi		0 1	mi			1.6 mi		0 mi
		ŀ	reshwa	ter Wetlar	id Hab					logical Thresl		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		rub/Scrub and rested Wetland
_	0) mi		0 mi		0 1				0 mi		0 mi
						-			-	oonse Operatio		
Socioeconomic Impacts	precautic could ca derailed for socio includin (about 4 would b Cortland intakes t Additior	onary cle use effec and/or bu beconomi g residue 9 miles). e most af lt to Sleep hat may l	arance z ts on con urned tra c effects and odo Riversic fected on by Hollo be affect itionary	ones might mmunities a in cars are s; shorefron or. SCAT of le parks, m n the west s ww. Additio ed include:	cause and bu remov t marin peratio arinas, shore fi nal imp Charl	further impa sinesses. Fre ed. 70 miles has, beaches, ns and clean beaches, inc rom Highlan pacts may be es Point Mile	icts to ight i of sh park up w lustry ds to e expo e 43;	o vessel rail traff oreline s, and r ould be y, comm Nyack, erienced Indian	traffic fic may would real esta focuse nercial , and or d in oth Point N	be oiled above ate would be af ed on areas more property, and so the east shore er towns along	f pop or a fe e the ffecte re he shore e from g the Have	ulated areas ew days until the level of concern ed by oil, avily oiled front real estate n northern river. Water rstraw Mile 38.

Iona Island CBR 11,000-bbl Bakken Crude Spill (Winter-High Tide) Effects

Iona Island CBR 11,000-bbl Bakken Crude Spill (Winter-High Tide) Response

			Re	sponse Equipment	t and Plan Activat	ion		
	NCP and		Tier l	Response Require	ments	GI	RPs/ GRS (7 d	Ss Activated ays)
	USCG Type	Tie	er 1	Tier 2	Tier 3	Rail	Miles	River Miles
	Major Not defined	No requ	irement	No requirement	No requirement	2 rail miles QR-40 to QR42		12 river miles Mile 50-33 2016-76 to 2016-87
		R	esponse	Overview: Expect	ed Outcomes and	Challeng	es	
	Protective Boo	oming	Mecha	anical Recovery	Shoreline Cle	anup	Othe	er Challenges
Spill Response ²⁷	Average river cur 1 kt will reduce b effectiveness, containment and diversionary bood configurations to angled to prevent entrainment and so over; exclusion and deflection configuration to be used to prot sensitive areas. Potential ice condor may negatively in boom deployment	oom n be splash nd urations ect litions npact	rapid sp reduce a be recov mechan floating skimme shorelin boom ar vacuum skimme Potentia may neg	ically; mobilize self-propelled rs; set up te containment reas with -trucks and	About 17% is ant to cause shoreline contamination. Po SCAT; wetland f some substrate re due to penetration sandy beaches; of dock structures; of debris removal.	e erform lushing; moval n on iled	Bakken significa high ber area aro wetland challeng wetland may cau potentia of 22% leading and fish especial the spill dilution	bility during a spill is a ant danger, as are nzene vapors in und the spill. access may be ge; disturbance of s during response use effects; l for entrainment in water column to water intake kill concerns ly in areas near site prior to ; perform water tracking, and air

²⁷ At this time, there is no federal regulatory requirement for any specific contracted tiered response resource requirement. This does not mean that no response will take place.

Scenario	Loca			ource		olume	<u> </u>	Oil Ty		Season		Tide Stage
Description	Iona I	sland	CBR	train spill	11	,000 bbl	Ba	akken c	crude	Winter		Low
Spill		Annu	al Prob	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any	Volume)	S	pill of Type	and	Volun	ne	US		Hudson
		0.00	00046			0.000				0.2		0
	Lat/		Relea	ase Rate		telease te/Time		1odel l Durati		Winds		Water Temperature
Conditions	41.31 -73.99 41.30 -73.99	8598)628	Inst	antaneous		nuary 2012 2:30am		30 day	'S	South / mode (4-18 kts)		34°F
				Mass Ba	lance	at End of M	odel	Run (After 3	fter 30 Days)		
	Fate	Sur	face	Atmospl	nere	Water Columr	1	Sec	liment	Ashor	e	Degraded
	%	0.0)%	50.4%	6	21.1%		Ċ,	3.6%	17.2%	, b	6.4%
SIMAP Modeling	bbl	()	5,547	'	2,319			401	1,889)	707
Results	Spatial Extent of Exposure over Threshold								p to 30	Days After S	pill)	
	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)										-	
	Who (1 n			ssolved 01 mg/l)		cological 0 g/m ²)		cioeco (0.01 g		Ecologica (100 g/m ²		Socioeconomic (1 g/m ²)
	35,267	mil gal	19,84	0 mil gal	10	mi ² -days	1	2 mi^2 -c	lays	50 mi		69 mi
				-	•	Shore Type	(Mil	les ove	r Ecolo	gical Thresho	ld)	
	Be	drock	τ	Unconsolida Rock	ated	Sand 1	Beac	h	Mud	or Timber	A	rtificial Shore
	8.	5 mi		33.4 mi	0.2 mi					5 mi		0 mi
Ecological		Brac					-			Ecological T		
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		rub/Scrub and rested Wetland
Exposures	0.	3 mi		0.6 mi		0 1	ni			1.6 mi		0 mi
		I								logical Thres		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		rub/Scrub and rested Wetland
	() mi		0 mi		0 1				0 mi		0 mi
						-		-	-	onse Operati		
Socioeconomic Impacts	precautie could ca derailed for socio includin (about 5 would b Cortland intakes t	onary cle use effec and/or by peconomi g residue 0 miles). e most af lt to Sleep hat may	arance z ts on con urned tra c effects and odo Riversio fected of py Hollo be affect utionary	ones might mmunities a ain cars are a s; shorefrom or. SCAT op de parks, ma n the west s ow. Addition ted include:	cause : and bus remove t marin peration arinas, hore fr nal imp Charle	further impa sinesses. Fre ed. 69 miles as, beaches, as and cleam beaches, ind om Highlan beacts may be as Point Mile	cts to ight 1 of sh park up we ustry ds to expe \$43;	o vessel rail traf oreline s, and b ould be y, comm Nyack erience Indian	l traffic. fic may would real esta focuse nercial , and or d in oth Point M	be oiled above ate would be a d on areas mo property, and s the east shore er towns along	f pop or a fe e the ffecte re hea shore e from g the Haven	ulated areas ew days until the level of concern ed by oil, avily oiled front real estate n northern river. Water rstraw Mile 38.

Iona Island CBR 11,000-bbl Bakken Crude Spill (Winter-Low Tide) Effects

Iona Island CBR 11,000-bbl Bakken Crude Spill (Winter-Low Tide) Response

			R	Response Equipmen	t and Plan Activat	ion		
	NCP and		Tier	Response Requirer	nents	GI	RPs/ GRS (7 da	s Activated ays)
	USCG Type	Tier	1	Tier 2	Tier 3	Rail	Miles	River Miles
	Major Not defined	No require	ment	No requirement	No requirement		miles to QR42	12 river miles Mile 50-33 2016-76 to 2016-87
		R	espons	e Overview: Expect	ed Outcomes and	Challeng	es	
	Protective H	Booming	Mec	hanical Recovery	Shoreline Cle	anup	Othe	er Challenges
Spill Response ²⁸	Average river of 1 kt will reduce effectiveness, containment and diversionary be configurations angled to preve entrainment and over; exclusion deflection cont to be used to p sensitive areas Potential ice cont boom deploym	e boom nd oom to be ent id splash n and figurations rotect onditions y impact	rapid reduce be rec mecha floatin skimm shorel boom vacuu skimm Poten may n	evaporation and spreading will e amount that can overed anically; mobilize ng self-propelled ners; set up ine containment areas with m-trucks and ners. tial ice conditions egatively impact ning operations.	About 17% is and to cause shoreline contamination. P SCAT; wetland f some substrate re due to penetration sandy beaches; o dock structures; o debris removal.	e erform lushing; moval n on iled	Bakken significa high ber area aro wetland challeng wetland response effects; entrainm water co water in concern areas ne prior to water co	bility during a spill is a ant danger, as are izene vapors in und the spill; access may be ge; disturbance of s during e may cause potential for nent of 21% in blumn leading to take and fish kill s especially in ar the spill site dilution; perform blumn tracking, monitoring.

 $^{^{28}}$ At this time, there is no federal regulatory requirement for any specific contracted tiered response resource requirement. This does not mean that no response will take place.

Scenario	Location	Sou	rce	Volume		Oil Type	Seas	on	Tide
Description	Iona Island	CBR tr spill	ain	11,000 bbl	Bak	kken crude	Summe	er	High
Spill		An	nual P	robability			Historio	cal Annua (2000-20	al Frequency 015)
Probability	Spill of Type	e in Huds	on	Spill Volum	ie in	Hudson	US	5	Hudson
	0.000	0046		0.000	0003	35	0.2	2	0
	Lat/Lon	Release	e Rate	Release Date/Time	Ru	in Duration	Win	ds	Temperature
Conditions	41.31363 -73.98598 41.30628 -73.98100	Instanta	ineous	1 August 2012 4:00pm		30 days	SW /] (<4 k		81°F
Fire/Explosion	Pool Fire			Pool Fire		Vapor			Cloud Explosion
Probabilities	Probability/In 0.086	cident		Probability 0.00000003		Explosion/ 0.02		robability 000000084	
	Emergency	Dognon		Evacuat	ion /			alth/Safe	
Fire/Explosion Response ²⁹	Specific incident to be made early a attack fire or allow Port of Albany ha firefighting vesse a 1,500 gpm wate Kingston, Albany FD have NYS sup trailers w/monitor oil derailment fire	as to whet w it to but s small l, <i>Marine</i> r monitor and New oplied foa rs for rail	<i>l</i> with .	As an immediate measure, isolate for at least 50 me in all directions. Large Spill • Consider initial evacuation for at meters (1000 fee Fire • If tank, rail car involved in a fire 800 meters (1/2 f directions; also, evacuation for 80 mile) in all direc	spill eters l dow t lease et). or ta e, ISO mile cons 00 m	l or leak area s (150 feet) wnwind st 300 ank truck is OLATE for) in all sider initial heters (1/2 s.	irritate or bu Fire may pro and/or toxic Vapors may suffocation. Light, sweet contain light as butane an gases have b flammable g released, wh with an ignit oils may also a toxic inhal the vapor sp the character accident sce product may gasoline for	arn skin ar oduce irrit gases. cause diz crude oil ter flamm d propane been remo gasses can ten they co tion sourc o contain ation haza ace of the ristics of c nario, the range fro the lighte	ating, corrosive ziness or s will normally able gasses such (unless these ved). These readily ignite if ome in contact e. These crude hydrogen sulfide, ard material, in tank car. Due to crude oil, in an behavior of this
	Flammable		In	npac	cts from Fire	(Acres)			
	Distance Total			Residential		Commercia	l Indu	strial	Public Use
Safety Impacts	581 feet 0.2 acre			0 acres		0 acres	0 a	cres	0.2 acre
Sarety impacts	Downwind			Impacts from Explos			losion (Acres)		
	Distance Total			Residential Commercia			l Indu	strial	Public Use
						es 0 acres 68			

Iona Island CBR 11,000-bbl Bakken Crude Spill with Fire/Explosion

²⁹ If concurrent with a spill to the water, see also spill response tables. If there is a fire and/or explosion, some or even most of the oil may be consumed by the fire, reducing the amount of oil that would spill into the river and affect shorelines. In most cases, it would be necessary to conduct at least some oil spill cleanup in addition to fire-fighting, though those operations would be secondary to emergency fire-fighting operations.

Tappan Zee 2,500-bbl Home Heating Oil Spill

Tappan Zee 2,500-bbl Home Heating Oil Spill (Spring-High Tide) Effects

						<u> </u>	<u>`</u>			n nue) L		
S	Loca	tion		ource	V	olume		Oil Ty	pe	Season		Tide Stage
Scenario Description	Tappa Bric		with	r Allision Bridge utment	2,	500 bbl	Hon	ne heati	ng oil	Spring		High
Spill		Annu	ial Prob	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	S	oill of Type	and V	Volume	e	US		Hudson
		0.7	732			0.0)24			0.58		0
Conditions	Lat/		Relea	ase Rate	Da	telease te/Time		Aodel F Durati		Winds		Water Temperature
Conditions	41.07		Instan	itaneous	0	pril 2012 :00am		30 day		North / moder (10-20 kts)		50°F
				Mass B	alance	at End of Model Run (A			After 30	Days)		
	Fate	Surf	ace	Atmosph	phere Water Column			Sed	liment	Ashore	e	Degraded
	%	0.0				2.6%		0	.6%	0.9%		4.8%
SIMAP Modeling	bbl	1	,						14	24		121
Results			Spatial Extent of Exposu			sure over Th	resh	old (Up	o to 30 I	Days After Spi	ll)	
	Wate	r (Volum	e) – Eco	ological	face (Area x	x Days Exposed)		sed)	Shore	eline	(Length)	
	Who (1 n	le Oil		ssolved	Ecological (10 g/m ²)		Socioeconomic (0.01 g/m ²)			Ecological (100 g/m ²)		Socioeconomic (1 g/m ²)
	9,640 r					ni ² -days		$.5 \text{ mi}^2$ -c		0 mi	,	46 mi
	,	U	Shoreline Exposure by Shore Type (Miles over Ecological Threshold)									
	Be	drock		Unconsolid: Rock	•	d d				or Timber	-	artificial Shore
	() mi		0 mi		0 1	mi		0	0.05 mi		0 mi
		Bra	ckish/E	stuarine W	etland	Habitats Ex	xpose	ed (Mile	es over l	Ecological Th	resho	old)
Ecological Shoreline	Salt	marsh	U	Upper Inter Mix	tidal	Lower In		idal		ragmites Vetland		nrub/Scrub and prested Wetland
Exposures	0.2	26 mi		0 mi		01				0 mi	10	0 mi
			Freshw	ater Wetla	nd Hał	oitats Expos	ed (N	Ailes ov	ver Ecol	ogical Thresh	old)	
	Catta	il Marsh		Upper Inter Mix		Lower In M	nterti		Ph	ragmites Vetland	Sh	rub/Scrub and rested Wetland
	() mi		0 mi		0 1	ni			0 mi		0 mi
	Potential Socioeconomic Impacts from Spill and Response Operations											
Socioeconomic Impacts	would be estate wo areas mo shorefron Jersey, a towns alo	e oiled ab ould be at ore heavil nt real est nd on the ong the ri	ove the fected b y oiled (ate wou east sho ver. No	level of con y oil, incluct <1 mile). R ld be most a ore from Do water intake	cern fo ling res iverside affected bbs Fer es woul	r socioecono idue and odo e parks, mari l on the west rry to Manha	omic e or. SC nas, l shore ttan. d. Ad	effects; CAT op beaches e from I Additic ditional	shorefro erations , industr Nyack to onal imp l precaut		aches ould prop ewoo perie	s, parks, and real be focused on perty, and od Cliffs, New enced in other

	,			Response Equipmen	t and Plan Activati		,		
	NCP and			Response Requirem		r		Ss Activated lays)	
	USCG Type	Tier 1 (2	4 hrs)	Tier 2	Tier 3	Rail	Miles	River Miles	
	Major MMPD	4,000 ft bo 1,000 ft + 3 skimming = 1,200 bbl/c 2,400 bbl s	300 per system lay	n/a	n/a	n	/a	16 river miles Mile 24-8 2016-97 to 2016-109	
]	Respons	e Overview: Expect	ed Outcomes and (Challenge	es		
	Protective B	Booming	Mec	hanical Recovery	Shoreline Cle	anup	Oth	er Challenges	
	Average river c	currents of		vaporation and	About <1% is ant	icipated		bility during a	
Spill Response	0.7 kt will redu	ce boom		preading will	to cause shoreline		heating oil spill is not		
	effectiveness,			amount that can be	contamination. Pe			ant danger,	
	containment an			red mechanically;	SCAT; wetland fl			access may be	
	diversionary bo			ze floating self-	some substrate ren			ge; disturbance of	
	configurations			ed skimmers; set	due to penetration			s during response	
	angled to preve entrainment and			reline containment areas with vacuum-	sandy beaches; oi structures; oiled d		•	ise effects; l for entrainment	
	over: exclusion	•		and skimmers.	removal.	CUIIS		in water column	
	deflection conf		trucks	and skininers.	Temovai.			d to water intake	
	to be used to pr						•	kill concerns	
	sensitive areas.						especial	ly in areas near	
								site prior to	
							dilution	; perform water	
							column	tracking, and air	
							monitor	ing.	

Tappan Zee 2,500-bbl Home Heating Oil Spill (Spring-High Tide) Response

	,						<u> </u>						
. ·	Loca	tion		ource	V	olume		Oil Ty	ре	Season		Tide Stage	
Scenario Description	Tappa	n Zee	with	r Allision Bridge utment	2,:	500 bbl	Hom	ne heat	ing oil	Spring		Low	
Spill		Annu	ial Prob	ability Any	where	in Hudson	River	ſ				ual Frequency 2015)	
Probability	Spi	ill of Typ	e (Any '	Volume)	Sp	oill of Type	and V	Volum	e	US		Hudson	
·		0.7	32			0.0	024			0.58		0	
Conditions	Lat/I		Relea	ase Rate	Da	elease te/Time		1odel l Durati		Winds		Water Temperature	
Conditions	41.07 -73.88		Instar	ntaneous		oril 2012):00am		30 day	/S	North / moder (4-16 kts)	ate	50°F	
				Mass B	alance	at End of M		Run (After 30	Days)			
	Fate	Surf	ace	Atmosph	nere	Water Column		Sec	liment	Ashore	e	Degraded	
	%	0.0	%	68.9%	6	1.4%		0).5%	1.2%		4.4%	
SIMAP	bbl	0		1,722 36 12					31		110		
Modeling Results			Spatia	al Extent of	of Exposure over Threshold (Up to 30					Days After Spi	ll)		
	Water	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)										(Length)	
	Whole Oil Dissolved Ecological Socioeconomic Ecological Socioe											Socioeconomic (1 g/m ²)	
	9,495 n			7 mil gal		ni ² -days		.1 mi ² -		1 mi		55 mi	
			Shore	eline Expos	ure by	Shore Type	e (Mil	les ove	r Ecolog	(100 g/m²) (1 g/m²) 1 mi 55 mi ogical Threshold)			
	Be	drock	ι	Unconsolida Rock	ated	Sand	Beach	h	Mud	or Timber	А	rtificial Shore	
	C) mi		0.1 mi		0 1	mi			0.1 mi		0 mi	
		Bra	ckish/E	stuarine W	etland	Habitats Ex	xpose	d (Mil	es over]	Ecological Th	resho	old)	
Ecological Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M	nterti lix	dal		ragmites Vetland		rub/Scrub and rested Wetland	
Exposures	0.3	31 mi		0 mi		0 1	mi			0 mi		0 mi	
			Freshw	ater Wetla	nd Hab	oitats Expos	sed (N	files o	ver Ecol	ogical Thresh	old)		
	Cattail MarshUpper Intertidal MixLower Intertidal MixPhragmites WetlandShrub/Scrub ar Forested Wetland												
	0 mi 0 mi 0 mi 0 mi									0 mi			
			Poten	tial Socioed	conomi	c Impacts f	rom S	Spill ar	nd Resp	onse Operatio	ns		
Socioeconomic Impacts	would be estate wo areas mo shorefron Jersey, at towns alo	e oiled ab ould be af ore heavily nt real est nd on the ong the ri	ove the l fected b y oiled (ate woul east sho ver. No	level of con y oil, includ about 1 mile ld be most a ore from Do water intake	cern for ling res e). Rive affected bbs Fer es woul	r socioecond idue and ode erside parks, on the west ry to Manha	omic e or. SC marir shore attan. d. Add	effects; CAT op nas, be from Additiona ditiona	shorefro erations aches, in Nyack to onal imp l precau		aches ould ercial lewoo perie	s, parks, and real be focused on property, and od Cliffs, New nced in other	

Tappan Zee 2,500-bbl Home Heating Oil Spill (Spring-Low Tide) Effects

			F	Response Equipment	t and Plan Activati	on		
	NCP and		Tier	Response Requirem	ients	G		Ss Activated ays)
	USCG Type	Tier 1 (2	4 hrs)	Tier 2	Tier 3	Rail	Miles	River Miles
	Major MMPD	4,000 ft bo 1,000 ft + 1 skimming = 1,200 bbl/c 2,400 bbl s	300 per system lay	n/a	n/a	n	/a	12 river miles Mile 24-12 2016-97 to 2016-105
]	Respons	e Overview: Expecte	ed Outcomes and O	Challenge	es	
	Protective B	ooming	Mec	hanical Recovery	Shoreline Clea	anup	Oth	er Challenges
Spill Response	Average river c 0.7 kt will redu effectiveness, containment an diversionary bc configurations angled to preve entrainment an over; exclusion deflection conf to be used to pr sensitive areas.	ce boom d oom to be ent d splash and igurations rotect	rapid s reduce recover mobiliz propell up show	vaporation and preading will amount that can be red mechanically; ze floating self- led skimmers; set reline containment areas with vacuum- and skimmers.	About >1% is anti to cause shoreline contamination. Pe SCAT; wetland fly some substrate rer due to penetration sandy beaches; oil structures; oiled d removal.	rform ushing; noval on led dock	heating significa wetland challeng wetland; may cau potentia of <2% may leaa and fish especial the spill dilution;	bility during a oil spill is not unt danger, access may be ge; disturbance of s during response se effects; l for entrainment in water column d to water intake kill concerns ly in areas near site prior to ; perform water tracking, and air

Tappan Zee 2,500-bbl Home Heating Oil Spill (Spring-Low Tide) Response

	-											
Scenario	Loca	tion		ource	V	olume		Oil Ty	pe	Season		Tide Stage
Description	Tappar	n Zee	with	r Allision Bridge 1tment	2,	500 bbl	Hor	ne heat	ing oil	Summer		High
Spill		Annu	ıal Prob	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any V	Volume)	S	pill of Type	and	Volum	e	US		Hudson
		0.7	732			0.0)24			0.58		0
Conditions	Lat/l		Relea	ise Rate	Da	Release ite/Time		Model 1 Durati		Winds		Water Temperature
Conditions	41.07 -73.88		Instar	ntaneous	1 Au 4	igust 2012 :00pm		30 day	S	SW / light (<4 kts)		81°F
				Mass B	alance	at End of M	lode	l Run (After 30	Days)		
	Fate	Surf	face	Atmospl	nere	Water Column	l	See	diment	Ashor	e	Degraded
	%	0.0	%	79.0%	, D	12.6%		().2%	4.0%		4.2%
SIMAP	bbl	C)	1,974	ļ	316			4	101		105
Modeling Results			Spatia	l Extent of	Expos	sure over Th	resh	old (U	p to 30 I	Days After Spi	ill)	
	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)										(Length)	
	Whole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 g/m²)Socioeconomic (0.01 g/m²)Ecological (100 g/m²)Socioeconomic (1 g/m²)											Socioeconomic (1 g/m ²)
	1,917 n	nil gal	23,16	5 mil gal	18	mi ² -days	2	27 mi ² -o	days	3 mi		21 mi
			Shore	line Expos	ure by	Shore Type	e (Mi	les ove	r Ecolog	ical Threshol	d)	
	Be	drock	ι	Jnconsolida Rock	ated	Sand 1	Beac	h	Mud	or Timber	A	Artificial Shore
	0.	2 mi		2.6 mi		0 1	ni			0.3 mi		0 mi
Ecological		Bra	ckish/Es	stuarine W	etland	Habitats Ex	rpose	ed (Mil	es over l	Ecological Th		
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites /etland		hrub/Scrub and prested Wetland
	C) mi		0 mi		0 1	ni			0 mi		0 mi
	Freshwater Wetland Habitats Exposed (Miles over Ecological Threshold) 0 mi 0 mi 0 mi 0 mi											
											0 mi	
	C) mi		0 mi		0 1	ni			0 mi		0 mi
			Poten	tial Socioed	onomi	c Impacts fi	rom S	Spill ar	nd Resp	onse Operatio	ns	
Socioeconomic Impacts	would be estate wo areas mo Jersey or	e oiled ab ould be at ore heavil n the wes	ove the l ffected b y oiled (a t shore a	evel of con y oil, incluc about 3 mile nd Manhatt	cern fo ling res es). Sho an on tl	r socioecono idue and odo oreline impac he east shore	omic or. SO ets w . Ado	effects; CAT op ould be ditional	shorefro erations limited impacts	ont marinas, be and cleanup w to a small part may be experi	ache /ould : of F ience	es of shoreline s, parks, and real be focused on ort Lee, New d in other towns would likely be
	-					vicinity of th		-				-

Tappan Zee 2,500-bbl Home Heating Oil Spill (Summer-High Tide) Effects

			F	Response Equipment	and Plan Activati	on		
	NCP and			Response Requirem				Ss Activated ays)
	USCG Type	Tier 1 (2	4 hrs)	Tier 2	Tier 3	Rail	Miles	River Miles
	Major MMPD	4,000 ft bo 1,000 ft + 1 skimming 1,200 bbl/c 2,400 bbl s	300 per system lay	n/a	n/a	n	/a	0 river miles ³⁰ Mile 2 2016-97
]	Response	e Overview: Expecte	ed Outcomes and O	Challenge	s	
	Protective B	Booming	Mecl	nanical Recovery	Shoreline Clea	anup	Other Challenges	
Spill Response	Average river currents of 0.7 kt will reduce boom effectiveness, containment and diversionary boom configurations to be angled to prevent entrainment and splash over; exclusion and deflection configurations to be used to protect sensitive areas.		rapid s reduce recover mobiliz propell up show	vaporation and preading will amount that can be red mechanically; ze floating self- ed skimmers; set reline containment ureas with vacuum- and skimmers.	About 4% is antic to cause shoreline contamination. Pe SCAT; wetland fly some substrate rer due to penetration sandy beaches; oil structures; oiled d removal.	rform ushing; noval on led dock	heating significa wetland challeng wetland may cau potentia of <13% may lead and fish especial the spill dilution	bility during a oil spill is not ant danger, access may be ge; disturbance of s during response use effects; l for entrainment b in water column d to water intake kill concerns ly in areas near site prior to ; perform water tracking, and air

Tappan Zee 2,500-bbl Home Heating Oil Spill (Summer-High Tide) Response

³⁰ Note: Spill stays around bridge.
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Conditions41.07195 -73.88333Instantaneous1 August 2012 8:00am30 daysSW / light (<4 kts)		_,									Jw Hue)						
DescriptionTappan ZeeVinks Funkson Vinks Funkson Abutiment2,500 bblHome heating oilSummerLowSpill ProbabilityAnnual Probability Anywhere in Hudson RiverHistorical Annual Frequency (2000-2015)Spill of Type (Any Volume)Spill of Type and VolumeUSHudson0.7320.0240.580ConditionsLat/LonRelease Rate Date/FimeDurationWindsTemperature Temperature2.73.88333Instantaneous1 August 2012 8:00an30 daysSW / light (<4 kts)81°FFateSurfaceAtmosphereWater ColumnSedimentAshoreDegraded (<4 kts)Modeling ResultsSpatial Extent of Exposure over Threshold (Up to 30 Days After Spill)Socioeconomic (100 g/m²)Socioeconomic (100 g/m²)Socioeconomic (100 g/m²)Ecological Shoreline ExposuresShoreline EcologicalSocioeconomic (100 g/m²)Socioeconomic (100 g/m²)Socioeconomic (100 g/m²)Socioeconomic (100 g/m²)Ecological Shoreline ExposuresUpconsolidate Exposure by Shore Type (Miles over Ecological Threshold)Horisolate Shoreline Forested Vetland MixMitWetland Forested Vetland of miBedrock ExposuresOmiOmiOmiOmiOmiOmiOmiOmiOmiOmiOmiOmiOmiOmiOmiMass Shoreline ExposuresOmiOmiOmiOmiOmiOmiOmiOmiOmiOmiOmi	. ·	Loca	tion			V	olume		Oil Ty	pe	Season		Tide Stage				
Spill Probability Spill of Type (Any Volume) Spill of Type and Volume US Hudson Conditions Spill of Type (Any Volume) Spill of Type and Volume US Hudson Conditions Lat/Lon Release Rate Date/Time 0.024 0.58 0 Conditions Lat/Lon Release Rate Date/Time Duration Water Temperature 41.07195 -73.88333 Instantaneous 1 August 2012 30 days SW / light (<4 kts)		Tappa	n Zee	with	Bridge	2,	500 bbl	Hor	ne heat	ing oil	Summer		Low				
ProbabilitySpill of Type (Any Volume)Spill of Type and VolumeUSHudson0.7320.0240.580ConditionsLat/LonRelease RateReleaseModel Run Date/TimeWindsWaterMass Balance at End of Model Run (After 30 Days)FateSurfaceAtmosphereOolumn 8:00am30 daysSW/light (C4 kts)81°FSiMAP Modeling ResultsMass Balance at End of Model Run (After 30 Days)FateSurfaceAtmosphereOolumn 8:00amSW/light 	<th>Snill</th> <th></th> <th>Annu</th> <th>ial Prob</th> <th>ability Any</th> <th>where</th> <th>in Hudson</th> <th>Rive</th> <th>r</th> <th></th> <th></th> <th></th> <th></th>	Snill		Annu	ial Prob	ability Any	where	in Hudson	Rive	r							
Conditions Lat/Lon Release Rate Instantaneous Release Date/Time Silvary Model Run Duration Winds Water Temperature 41.07195 -73.88333 Instantaneous 1 August 2012 8:00am 30 days SW / light (<4 kts)		Spi	ill of Typ	e (Any V	Volume)	S	oill of Type	and	Volum	e	US		Hudson				
ConditionsLaULonRefease RateDate/TimeDurationWindsTemperature41.07195 -73.88333Instantaneous1 August 2012 8:00am30 daysSW / light (<4 kts)	<th></th> <td></td> <td>0.7</td> <td>/32</td> <td></td> <td></td> <td>0.0</td> <td>)24</td> <td></td> <td></td> <td>0.58</td> <td></td> <td>0</td>			0.7	/32			0.0)24			0.58		0			
Simap 41.07195 (-73.88333) Instantaneous 1 August 2012 (Solam) 30 days SW / Ignt (Sd kts) 81°F Mass Balance at End of Model Run (After 30 Days) Fate Surface Atmosphere Water Column Sediment Ashore Degraded % 0.0% 75.9% 13.2% 0.2% 6.1% 4.7% bbl 0 1.896 330 4 153 116 Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length) Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length) Socioeconomic Whole Oil Dissolved Ecological Socioeconomic 10 g/m ²) (100 g/m ²) (1 g/m ²) 3.639 mil gal 2.6,184 mil gal 11 mi ² -days 18 mi ² -days 5 mi 16 mi Bedrock Rock Sand Beach Mud or Timber Artificial Shore 0.2 mi 5 mi 0 mi 0.3 mi 0 mi	Conditions			Relea	ase Rate	Da	te/Time						Water Temperature				
SIMAP Modeling ResultsFateSurfaceAtmosphereWater ColumnSedimentAshoreDegraded%0.0%75.9%13.2%0.2%6.1%4.7%bbl01,8963304153116Water (Volume) - EcologicalSurface (Area x Days Exposed)Shoreline (Length)Water (Volume) - EcologicalSurface (Area x Days Exposed)Shoreline (Length)Whole OilDissolvedEcologicalSocieeconomicSocieeconomic(1 mg/t)(0.001 mg/t)(10 g/m²)(100 g/m²)(100 g/m²)Artificial Shoreline Exposure by Shore Type (Miles over Ecological Threshold)BedrockMockBedrockUnconsolidated RockOni <td <="" colspan="4" td=""><th>Conditions</th><td></td><td></td><td>Insta</td><td></td><td>8</td><td>:00am</td><td></td><td></td><td>5</td><td>(<4 kts)</td><td></td><td>81°F</td></td>	<th>Conditions</th> <td></td> <td></td> <td>Insta</td> <td></td> <td>8</td> <td>:00am</td> <td></td> <td></td> <td>5</td> <td>(<4 kts)</td> <td></td> <td>81°F</td>				Conditions			Insta		8	:00am			5	(<4 kts)		81°F
Fate Surface Atmosphere Column Sediment Ashore Degraded % 0.0% 75.9% 13.2% 0.2% 6.1% 4.7% Modeling Results bbl 0 1,896 330 4 153 116 Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length) 0.2% 6.1% 4.7% Whole Oil Dissolved Ecological Socioeconomic Ecological Socioeconomic Item (Length) 3,639 mil gal 26,184 mil gal 11 mi ² -days 18 mi ² -days 5 mi 16 mi 0.2 mi 5 mi 0 mi 0.3 mi 0 mi 0 mi 0.2 mi 5 mi 0 mi 0.3 mi 0 mi 0 mi 0.2 mi 5 mi 0 mi 0 mi 0.3 mi 0 mi 0.2 mi 5 mi 0 mi 0.3 mi 0 mi 0.1 mi 0 mi 0 mi 0 mi 0 mi 0 mi 0 mi 0.1 mi 0 mi 0 mi					Mass B	alance					After 30 Days)						
SIMAP Modeling Resultsbbl01.8963304153116Modeling ResultsSpatial Extent of Exposure over Threshold (Up to 30 Days After Spill)Water (Volume) - EcologicalSurface (Area x Days Exposed)Shoreline (Length)Water (Volume) - EcologicalSurface (Area x Days Exposed)Shoreline (Length)SocioeconomicEcologicalSocioeconomicEcologicalSocioeconomicEcologicalSocioeconomicIf g/m2(100 g/m2)(10 g/m2)(1 g/m2)3.639 mil gal26,184 mil gal11 mi²-days18 mi²-days5 mi16 miShoreline Exposure by Shore Type (Miles over Ecological Threshold)BedrockUnconsolidated RockSand BeachMud or TimberArtificial Shore0.2 mi5 mi0 mi0.3 mi0 mi0 mi0.2 mi5 mi0 mi0.3 mi0 mi0 mi0 mi0.1 mi0 mi0 mi0 mi0 mi0 mi0 mi0.1 mi0 mi0 mi0 mi0 mi0 miOther IntertidalPreshwater Wetland Habitats Exposed (Miles over Ecological Threshold)Ecological MixMixMixMixWetlandForested Wetland0 mi0 mi0 mi0 mi0 miOther IntertidalPhragmitesShrub/Scrub and Forested WetlandOther IntertidalPhragmitesShr		Fate	Surf	ace	Atmospl	nere		1	Se	diment	Ashor	e	Degraded				
Modeling Results Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill) Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length) Whole Oil (1 mg/l) Dissolved Ecological Socioeconomic (0.001 mg/l) Socioeconomic 3,639 mil gal 26,184 mil gal 11 mi ² -days 18 mi ² -days 5 mi 16 mi Bedrock Unconsolidated Rock Sand Beach Mud or Timber Artificial Shore 0.2 mi 5 mi 0 mi 0.3 mi 0 mi 0 mi 0.2 mi 5 mi 0 mi 0.3 mi 0 mi 0 mi 0.2 mi 0 mi 0.1 mi 0 mi 0.3 mi 0 mi 0 mi 0.2 mi 0 mi 0.1 mi 0 mi 0 mi 0 mi 0 mi 0 mi 0 mi 0 mi 0.1 mi 0 mi 0 mi 0.1 mi 0 mi		%	0.0	%	75.9% 13.2% 0.2%			0.2%	6.1%		4.7%						
Results Spatial Extent of Exposure over Threshold (Up to 30 Days After Spill) Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length) Whole Oil Dissolved Ecological Socioeconomic Ecological Socioeconomic (1 mg/l) (0.001 mg/l) (10 g/m ²) (0.01 g/m ²) (100 g/m ²) (1 g/m ²) 3,639 mil gal 26,184 mil gal 11 mi ² -days 18 mi ² -days 5 mi 16 mi Bedrock Unconsolidated Rock Sand Beach Mud or Timber Artificial Shore 0.2 mi 5 mi 0 mi 0.3 mi 0 mi 0.3 mi 0 mi 0.2 mi 5 mi 0 mi 0.3 mi 0 mi 0 mi 0 mi 0.2 mi 5 mi 0 mi 0 mi 0.1 mi 0 mi 0 mi 0 mi 0 mi 0 mi 0 mi 0 mi 0 mi 0 mi 0 mi 0 mi </td <th></th> <td>bbl</td> <td>0</td> <td></td> <td colspan="5">-,</td> <td>153</td> <td></td> <td>116</td>		bbl	0		-,					153		116					
Whole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 g/m²)Socioeconomic (0.01 g/m²)Ecological (100 g/m²)Socioeconomic (1 g/m²)3,639 mil gal26,184 mil gal11 mi²-days18 mi²-days5 mi16 mi3,639 mil gal26,184 mil gal11 mi²-days18 mi²-days5 mi16 miShoreline Exposure by Shore Type (Miles over Ecological Threshold)BedrockUnconsolidated RockSand BeachMud or TimberArtificial Shore0.2 mi5 mi0 mi0.3 mi0 miBedrockUnconsolidated Rock0.2 mi5 mi0 mi0.3 mi0 miBrackish/Estuarine Wetland Habitats Exposed (Miles over Ecological Threshold)SaltmarshUpper Intertidal MixDever Intertidal Mix0 mi0.1 mi0 mi0 mi0 mi0 mi0.1 mi0 mi0 mi0 miOtential Socioeconomic Impacts from Spill and Response OperationsResponse operations may cause some impacts to vessel traffic along river for a few days. 16 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and rea estate would be affected by oil, including residue and odor. SCAT operations and cleanup would be focused on areas more heavily oiled (about 5 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Nyack to Englewood, New Jersey, and on the east shore from Dobbs Ferry to Manhattan. Additional impacts may be experienced i				Spatia	patial Extent of Exposure over Threshold (Up to 30 l				ays After Spi	ill)							
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Ecological Shoreline ExposuresSaltmarshUpper Intertidal MixLower Intertidal MixPhragmites WetlandShrub/Scrub and Forested Wetland0 mi0 mi0.1 mi0 mi0 mi0 mi0 mi0 mi0.1 mi0 mi0 mi0 mi0 miFreshwater Wetland Habitats Exposed (Miles over Ecological Threshold)Cattail MarshUpper Intertidal MixLower Intertidal MixPhragmites MixShrub/Scrub and Forested Wetland0 mi0 misocioeconomicExposeForested by oil, including residue and odor. SCAT operations and cleanup would be focused on areas more heavily oiled (about 5 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Nyack to Englewood, New Jersey, and on the east shore from Dobbs Ferry to Manhattan. Additional impacts may be experienced in other		0.	2 mi		5 mi		0 1	mi		().3 mi		0 mi				
Shoreline ExposuresSaltmarshUpper Intertidal MixLower Intertidal MixPhragmites WetlandShrub/Scrub and Forested Wetland0 mi0 mi0.1 mi0 mi0 mi0 mi0 miFreshwater Wetland Habitats Exposed (Miles over Ecological Threshold)Cattail MarshUpper Intertidal MixLower Intertidal MixPhragmites WetlandShrub/Scrub and Forested Wetland0 mi0 miPotential Socioeconomic Impacts from Spill and Response OperationsResponse operations may cause some impacts to vessel traffic along river for a few days. 16 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and rea estate would be affected by oil, including residue and odor. SCAT operations and cleanup would be focused on areas more heavily oiled (about 5 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Nyack to Englewood, New Jersey, and on the east shore from Dobbs Ferry to Manhattan. Additional impacts may be experienced in other towns along the	Feelogical		Bra					_									
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Socioeconomic Impacts Mix Mix Wetland Forested Wetland 0 mi 0 mi 0 mi 0 mi 0 mi 0 mi Socioeconomic Impacts Response operations may cause some impacts to vessel traffic along river for a few days. 16 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and real estate would be affected by oil, including residue and odor. SCAT operations and cleanup would be focused on areas more heavily oiled (about 5 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Nyack to Englewood, New Jersey, and on the east shore from Dobbs Ferry to Manhattan. Additional impacts may be experienced in other towns along the		Catta									-	Sł					
Socioeconomic Impacts Potential Socioeconomic Impacts from Spill and Response Operations Response operations may cause some impacts to vessel traffic along river for a few days. 16 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and rea estate would be affected by oil, including residue and odor. SCAT operations and cleanup would be focused on areas more heavily oiled (about 5 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Nyack to Englewood, New Jersey, and on the east shore from Dobbs Ferry to Manhattan. Additional impacts may be experienced in other towns along the		Mix Mix Wetland For															
Socioeconomic Impacts Response operations may cause some impacts to vessel traffic along river for a few days. 16 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and rea estate would be affected by oil, including residue and odor. SCAT operations and cleanup would be focused on areas more heavily oiled (about 5 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Nyack to Englewood, New Jersey, and on the east shore from Dobbs Ferry to Manhattan. Additional impacts may be experienced in other towns along the		C) mi		-		-				-		0 mi				
Socioeconomic Impacts would be oiled above the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and real estate would be affected by oil, including residue and odor. SCAT operations and cleanup would be focused on areas more heavily oiled (about 5 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Nyack to Englewood, New Jersey, and on the east shore from Dobbs Ferry to Manhattan. Additional impacts may be experienced in other towns along the		P							-		=						
for certain parts of the river in the vicinity of the spill.		would be estate wo areas mo shorefron the east s river. No	e oiled ab ould be af ore heavily nt real est shore fror o water in	ove the l fected b y oiled (a ate woul n Dobbs takes wo	evel of con y oil, includ about 5 mild ld be most a Ferry to M puld be affed	cern fo ling res es). Riv affected anhatta cted. A	r socioecono idue and odo verside parks on the west n. Additiona dditional pre	omic or. S(, mai shor il imj	effects; CAT of rinas, b re from pacts m	shorefro perations eaches, in Nyack to ay be exp	nt marinas, be and cleanup w ndustry, comm Englewood, perienced in o	ache ould ercia New	s, parks, and real be focused on ll property, and Jersey, and on owns along the				

Tappan Zee 2,500-bbl Home Heating Oil Spill (Summer-Low Tide) Effects

			F	Response Equipment	t and Plan Activati	on		-	
	NCP and		Tier	Response Requirem	ients	G		Ss Activated ays)	
	USCG Type	Tier 1 (2	4 hrs)	Tier 2	Tier 3	Rail	Miles	River Miles	
	Major MMPD	4,000 ft bo 1,000 ft + 1 skimming 1,200 bbl/c 2,400 bbl s	300 per system lay	n/a	n/a	n	/a	2 river miles Mile 24-26 2016-97 to 2016-96	
]	Response	e Overview: Expecte	ed Outcomes and O	Challenge	es		
	Protective B	ooming	Mecl	hanical Recovery	Shoreline Cle	anup	Other Challenges		
Spill Response	Average river c 0.7 kt will redu effectiveness, containment an diversionary bc configurations angled to preve entrainment and over; exclusion deflection conf to be used to pr sensitive areas.	ce boom d oom to be nt d splash and igurations rotect	rapid s reduce recover mobiliz propell up show	vaporation and preading will amount that can be red mechanically; ze floating self- ed skimmers; set reline containment areas with vacuum- and skimmers.	About 6% is antic to cause shoreline contamination. Pe SCAT; wetland fl some substrate ren due to penetration sandy beaches; oi structures; oiled d removal.	erform ushing; moval on led dock	heating significa wetland challeng wetland may cau potentia of >13% may lea and fish especial the spill dilution	bility during a oil spill is not ant danger, access may be ge; disturbance of s during response use effects; l for entrainment b in water column d to water intake kill concerns ly in areas near site prior to ; perform water tracking, and air	

Tappan Zee 2,500-bbl Home Heating Oil Spill (Summer-Low Tide) Response

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G	Loca	tion		ource	V	olume		Oil Ty	pe	Season		Tide Stage
Scenario Description	Tappa	n Zee	with	r Allision Bridge utment	2,	500 bbl	Hon	ne heat	ing oil	Winter		High
Spill		Annu	al Prob	ability Any	where	in Hudson	River	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	S	oill of Type	and V	Volum	e	US		Hudson
·		0.7	32			0.0)24			0.58		0
Conditions	Lat/		Relea	ase Rate	Da	telease te/Time		/lodel] Durati		Winds		Water Temperature
Conditions	41.07 -73.88		Insta	ntaneous		nuary 2012 3:00am		30 da	ys	South / mode (4-18 kts)		35°F
				Mass B	alance	at End of M	lodel	Run (After 30	Days)		
	Fate	Surf	ace	Atmospl	nere	Water Column	ı	See	diment	Ashor	e	Degraded
	%	0.0	%	66.2%	6	5.3%		1	1.5%	5.4%		9.3%
SIMAP	bbl	1		1,655 133 37					37	135		232
Modeling Results			Spatia	al Extent of	t of Exposure over Threshold (Up to 30				p to 30 I	Days After Spi	ill)	
	Water (Volume) - Ecological Surface (Area x Days Exposed) Shoreline (Length)										(Length)	
	Whole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 g/m²)Socioeconomic (0.01 g/m²)Ecological (100 g/m²)Socioeconomic (100 g/m²)											Socioeconomic (1 g/m ²)
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$											60 mi
			Shore	eline Expos	ure by	Shore Type	e (Mil	les ove	r Ecolog	gical Threshol	d)	
	Be	drock	ι	Unconsolida Rock	ated	Sand	Beacl	h	Mud	or Timber	A	Artificial Shore
	0.	1 mi		1.8 mi		0 1	mi		(0.2 mi		0 mi
		Bra	ckish/E	stuarine W	etland	Habitats Ex	xpose	d (Mil	es over l	Ecological Th	resho	old)
Ecological Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In	nterti lix	idal		ragmites Vetland		nrub/Scrub and prested Wetland
Exposures	0.	4 mi		0 mi		0 1	mi			0 mi		0 mi
			Freshw	ater Wetla	nd Hat	oitats Expos	ed (N	/liles o	ver Ecol	ogical Thresh	old)	
	Cattall March 11										nrub/Scrub and prested Wetland	
	0) mi		0 mi		0 1	mi			0 mi		0 mi
			Poten	tial Socioed	conomi	c Impacts f	rom S	Spill ar	nd Resp	onse Operatio	ns	
Socioeconomic Impacts	would be estate wo areas mo shorefron east shor water int	e oiled ab ould be af ore heavily nt real est re from H cakes wou	ove the l fected b y oiled (ate woul astings t ld be aff	level of con y oil, includ about 2 mild ld be most a o Yonkers.	cern for ling res es). Riv affected Additic itional	r socioecond idue and ode verside parks on the west onal impacts	omic e or. SC , mar shore may	effects; CAT op inas, b e from be exp	shorefro perations eaches, i Nyack to erienced	and cleanup w ndustry, comm o Alpine, New in other towns	aches ould hercia Jerse alon	s, parks, and real be focused on l property, and

Tappan Zee 2,500-bbl Home Heating Oil Spill (Winter-High Tide) Effects

				Response Equipment			-,		
	NCP and			Response Requirem				Ss Activated lays)	
	USCG Type	Tier 1 (2	4 hrs)	Tier 2	Tier 3	Rail	Miles	River Miles	
	Major MMPD	4,000 ft bo 1,000 ft + 3 skimming 1,200 bbl/c 2,400 bbl s	300 per system lay	n/a	n/a	n	/a	3 river miles Mile 24-21 2016-97 to 2016-98	
]	Respons	e Overview: Expect	ed Outcomes and O	Challenge	s		
	Protective B	ooming	Mec	hanical Recovery	Shoreline Clea	anup	Other Challenges		
Spill Response	Average river c 0.7 kt will redu effectiveness, containment an diversionary bc configurations angled to preve entrainment and over; exclusion deflection confi to be used to pr sensitive areas. Potential ice co may negatively boom performa	ce boom d oom to be nt d splash and igurations otect nditions impact	rapid s reduce recover mobili propell up sho boom a trucks Potenti may ne	vaporation and preading will amount that can be red mechanically; ze floating self- led skimmers; set reline containment areas with vacuum- and skimmers.	About >5% is anti to cause shoreline contamination. Pe SCAT; wetland fl some substrate ren due to penetration sandy beaches; oil structures; oiled d removal.	erform ushing; noval on led dock	heating significa wetland challeng wetland may cau potentia of >5% may lead and fish especial the spill dilution	bility during a oil spill is not ant danger, access may be ge; disturbance of s during response use effects; l for entrainment in water column d to water intake kill concerns ly in areas near site prior to ; perform water tracking, and air ing.	

Tappan Zee 2,500-bbl Home Heating Oil Spill (Winter-High Tide) Response

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~ ·	Loca	tion		ource	V	olume		Oil Ty	pe	Season		Tide Stage
Scenario Description	Tappa	n Zee	with	r Allision Bridge utment	2,	500 bbl	Hon	ne heat	ing oil	Winter		Low
Spill		Annu	al Prob	ability Any	where	in Hudson	Rive	r				ual Frequency 2015)
Probability	Spi	ill of Typ	e (Any '	Volume)	S	oill of Type	and V	Volum	e	US		Hudson
		0.7	32			0.0)24			0.58		0
Conditions	Lat/I		Relea	ase Rate	Da	telease te/Time		/lodel Durati		Winds		Water Temperature
Conditions	41.07 -73.88		Insta	ntaneous		10000000000000000000000000000000000000		30 da	ys	South / mode (4-18 kts)	rate	35°F
				Mass B	alance	at End of M	lodel	Run (After 30	Days)		
	Fate	Surf	ace	Atmosph	nere	Water Column	l	Sec	liment	Ashor	e	Degraded
	%	0.0	%	66.3%	6	5.0%		1	.4%	7.0%		9.1%
SIMAP	bbl	1	1,658 124 35					35	174		229	
Modeling Results			Spatia	Spatial Extent of Exposure over Threshold (Up to 30				Days After Spi	ll)			
	Water (Volume) – Ecological Surface (Area x Days Exposed) Shoreline (Length)										(Length)	
	Whole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 g/m²)Socioeconomic (0.01 g/m²)Ecological (100 g/m²)Socioec (100 g/m²)											Socioeconomic (1 g/m ²)
	10,611			6 mil gal		ni ² -days	5 mi ² -days			3 mi		54 mi
			Shore	eline Expos	ure by	Shore Type	e (Mil	les ove	r Ecolog	ical Threshol	d)	
	Be	drock	ι	Unconsolida Rock	ated	Sand 1	Beacl	h	Mud	or Timber	A	artificial Shore
	0.	1 mi		2.3 mi		0 1	mi		(0.2 mi		0 mi
		Bra	ckish/E	stuarine W	etland	Habitats Ex	xpose	d (Mil	es over l	Ecological Th	resho	old)
Ecological Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites /etland		nrub/Scrub and prested Wetland
Exposures	0.	4 mi		0 mi		0 1	mi			0 mi		0 mi
			Freshw	ater Wetla	nd Hab	oitats Expos	ed (N	files o	ver Ecol	ogical Thresh	old)	
	(attall March 11										nrub/Scrub and prested Wetland	
	0 mi 0 mi 0 mi 0 mi									0 mi		
			Poten	tial Socioec	conomi	c Impacts fi	rom S	Spill ar	nd Respo	onse Operatio	ns	
Socioeconomic Impacts	would be estate wo areas mo shorefron on the ea along the	e oiled ab ould be af ore heavily nt real est ast shore f e river. No	ove the l fected b y oiled (ate would rom Has o water i	level of con- y oil, includ about 3 mild ld be most a stings-on-H- intakes wou	cern for ling res es). Riv offected udson t ld be af	r socioecono idue and odo rerside parks on the west o Riverdale.	omic e or. SC , mar shore Addi itiona	effects; CAT op inas, be e from itional il preca	shorefro perations eaches, in Orangeto impacts	and cleanup w ndustry, comm own to Englew may be experie	aches ould ercia ood, enced	s of shoreline s, parks, and real be focused on l property, and New Jersey, and l in other towns would likely be

Tappan Zee 2,500-bbl Home Heating Oil Spill (Winter-Low Tide) Effects

-appan =0	,			Response Equipment	t and Plan Activatio		/		
	NCP and			Response Requirem				Ss Activated ays)	
	USCG Type	Tier 1 (2	4 hrs)	Tier 2	Tier 3	Rail	Miles	River Miles	
	Major MMPD	4,000 ft bo 1,000 ft + 2 skimming = 1,200 bbl/c 2,400 bbl s	300 per system lay	n/a	n/a	I	n/a	8 river miles Mile 23-15 2016-97 to 2016-103	
				e Overview: Expecte	ed Outcomes and Cl	hallenge	s		
	Protective B	ooming	Mech	nanical Recovery	Shoreline Clear	nup	Other Challenges		
Spill Response	Average river c 0.7 kt will redu effectiveness, containment an diversionary bo configurations angled to preve entrainment and over; exclusion deflection confi to be used to pr sensitive areas. Potential ice co may negatively boom performa	ce boom d oom to be nt d splash and gurations otect nditions impact	rapid sj reduce recover mobiliz propell up shor boom a trucks a Potenti may ne	vaporation and preading will amount that can be red mechanically; ze floating self- ed skimmers; set reline containment ureas with vacuum- and skimmers. al ice conditions gatively impact er operations	About 7% is anticip to cause shoreline contamination. Per SCAT; wetland flu some substrate rem due to penetration of sandy beaches; oile structures; oiled de removal.	form shing; loval on ed dock	heating of significa wetland challeng wetlands may cau potential of 5% in may lead and fish especiall the spill dilution;	bility during a bil spill is not nt danger, access may be e; disturbance of a during response se effects; for entrainment water column to water intake kill concerns y in areas near site prior to perform water tracking, and air ng.	

Tappan Zee 2,500-bbl Home Heating Oil Spill (Winter-Low Tide) Response

Tappan Zee 50-bbl Heavy Fuel Oil Spill

Tappan Zee 50-bbl Heavy Fuel Oil Spill (Spring-High Tide) Effects

	Loca	tion	So	ource	V	olume		Oil Type		Season		Tide Stage
Scenario Description	Tappa	n Zee	with	Allision Bridge utment	4	50 bbl	He	avy Fuel (Dil	Spring		High
Spill		Annua	al Proba	ability Any	where	in Hudson	Rive	er				ual Frequency 2015)
Probability	Spi	ll of Type	e (Any V	Volume)	S	pill of Type	and	Volume		US		Hudson
		0.7	32			0.0				17.2		0
Conditions	Lat/l		Relea	se Rate	Da	elease te/Time		Iodel Rui Duration		Winds		Water Temperature
	41.07 -73.88		Instan	taneous		oril 2012 :00am		30 days	N	orth / moder (10-20 kts)	ate	50°F
				Mass Ba	alance		Iodel Run (After 3		ter 30]	• 30 Days)		-
	Fate	Surf	ace	Atmosp	here	Water Columr	Sediment			Ashore	e	Degraded
	%	0.0	%	8.7%	5	0.0%		0.09	%	69.2%)	22.1%
SIMAP Modeling	bbl	0	0 4 0 0						35		11	
Results			Spatial	Extent of	Exposure over Th		hreshold (Up to 30		o 30 Da	ays After Sp		
		(Volum	1	0			x Days Exposed					(Length)
	Whol (1 n			solved)1 mg/l)	Ecological (10 g/m ²)		Socioeconon (0.01 g/m ²)			Ecological (100 g/m ²)		Socioeconomic (1 g/m ²)
	2 mil					mi ² -days		41 mi ² -day		0 mi	,	38 mi
				-	ire by	Shore Type	(Mi	les over E	cologi	cal Thresho	ld)	
	Bee	drock	U	Inconsolid Rock	ated	Sand	Beac	h I	Mud o	r Timber	A	rtificial Shore
	0	mi		0 mi		0 1	mi		0	mi		0 mi
Ecological		Brack	kish/Est	uarine Wo	etland		xposed (Miles over		over Ecological Tl			
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		gmites tland		nrub/Scrub and prested Wetland
Exposures	0.3	31 mi		0 mi		0 1	mi		0	mi		0 mi
		F								gical Thresł		
	Cattail MarshUpper Intertidal MixLower Intertidal MixPhragmites Wetland											nrub/Scrub and prested Wetland
	0	mi		0 mi		0 1	mi		0	mi		0 mi
						_		-	_	nse Operatio		
Socioeconomic Impacts	of conce oil, inclu (about < would be Dobbs F Addition	rn for soc iding resid 1 mile). Fe e most aff erry to M hal impact hal precau	eioeconc due and Riverside fected or fanhattar ts may b tionary	omic effects odor. SCA e parks, ma n the west s n, though the e experience fishing adv	s; shore T oper rinas, l shore fi ne oilin ced in o	efront marina ations and c beaches, ind rom Nyack t g of shorelin other towns	as, be leanu ustry o Foi ies w along	eaches, par p would b , commerce rt Lee, Ne rould likel g the river.	rks, and be focus cial pro w Jerse y be lir No wa	I real estate y sed on areas perty, and sh y, and on the nited to pate	woul more noref e eas hy an would	l above the level d be affected by e heavily oiled ront real estate t shore from reas and tarballs. d be affected. iver in the

						,	<u> </u>		
			R	Response Equipme	nt and Plan Activ	ation			
	NCP and		Tier l	Response Requirer	nents	GR		Ss Activated ays)	
	USCG Type	Tier	1	Tier 2	Tier 3	Rail M	liles	River Miles	
	Not major AMPD ³¹	n/a	l	n/a	n/a	n/a		19 river miles Mile 24-5 2016-97 to 2016-110	
		R	esponse	e Overview: Expec	ted Outcomes an	d Challeng	es		
	Protective Bo	ooming	Mec	hanical Recovery	Shoreline C	leanup	Other Challenges		
Spill Response	Average river cu 0.7 kt will reduce effectiveness, containment and diversionary boo configurations the angled to prevent entrainment and over; exclusion deflection configuration sensitive areas.	te boom l om o be nt splash and gurations	anticip evapo spreac reduce be rec mecha floatin skimn shorel boom	9% evaporation is pated thus ration and rapid ling will minimally e amount that can overed anically; mobilize ng self-propelled ners; set up line containment areas with m-trucks and pers	About 69% is a to cause shorel contamination anticipation we a significant sh cleanup operat Perform SCAT flushing; some removal due to penetration on beaches; oiled structures; oile removal.	ine so buld be for oreline ion. '; wetland substrate sandy dock	heating signific wetlan challer wetlan may ca potenti in this in wate howev water of	hability during a g oil spill is not cant danger, d access may be nge; disturbance of ds during response ause effects; ial for entrainment scenario is for 0% er column; er, still perform column tracking, monitoring.	

Tappan Zee 50-bbl Heavy Fuel Oil Spill (Spring-High Tide) Response

³¹ Required only when transferring cargo; underway allisions, no specific AMPD requirement, though a spill response would be undertaken.
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i appair =0			Juvy				ing	LU		ie) Ellec	13	
~ .	Loca	tion		ource	V	olume		Oil Ty	pe	Season		Tide Stage
Scenario Description	Tappa	n Zee	with	r Allision Bridge utment	4	50 bbl	He	avy Fu	el Oil	Spring		Low
Spill		Annu	al Prob	ability Any	where	in Hudson	Rive	er				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volun	ne	US		Hudson
		0.7	32			0.0)93			17.2		0
Conditions	Lat/		Relea	ase Rate	Da	lelease te/Time		Iodel Durati		Winds		Water Temperature
Conditions	41.07 -73.8		Instar	ntaneous		pril 2012):00am		30 day	ys	North / mode (4-16kts)	rate	50°F
				Mass Ba	alance	at End of M	lode	Run ((After 3	0 Days)		
	Fate	Surf	face	Atmosp	here	Water Columr	ı	Se	diment	Ashor	·e	Degraded
	%	0.0	1%	8.2%	2	0.0%		(0.0%	69.69	6	22.1%
SIMAP Modeling	bbl	C)	4		0			0	35		11
Results			Spatial	Extent of	Expos	ure over Th	resh	old (U	p to 30	Days After S	pill)	
	Water	· (Volum	e) – Eco	ological	Surf	face (Area x	. Day	s Exp	osed)	Shor	eline	(Length)
	Whol (1 n	le Oil ng/l)		ssolved 01 mg/l)		cological 0 g/m ²)		cioeco (0.01 g	nomic /m ²)	Ecologica (100 g/m ²	al 2)	Socioeconomic (1 g/m ²)
	3 mil	l gal	<1	00 gal	0.43	mi ² -days	0.	43 mi ² ·	-days	1 mi		35 mi
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
	Be	drock	ι	Jnconsolid Rock	ated	Sand	Beac	h	Mud	or Timber	A	Artificial Shore
	0) mi		0.36 mi	0 mi			0.1 mi			0 mi	
Ecological		Brac	kish/Est	tuarine We	etland	Habitats Ex	cpose	d (Mi	iles over Ecological T			nold)
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		nrub/Scrub and prested Wetland
Laposures	0.2	26 mi		0 mi		0 1	mi			0 mi		0 mi
		ŀ	reshwa	ter Wetlar	nd Hab	-				ological Thres		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		nrub/Scrub and prested Wetland
	() mi		0 mi		0	mi			0 mi		0 mi
						-		-	-	oonse Operati		
Socioeconomic Impacts	of conce oil, inclu (about 1 would be Hastings tarballs. affected.	rn for soo iding resi mile). Ri e most af s-on-Hud Addition	omic effects odor. SCA parks, mari n the west s onkers, tho cts may be	s; shore T oper inas, be shore fi ough the experie	efront marina ations and c eaches, indus com Oranget e oiling of sl enced in othe	as, be leanu stry, o cown horel er tov	eaches, p wou comme to Alp ines wo vns alo	parks, a ld be fo ercial pr ine, Nev ould like ng the r	and real estate cused on areas operty, and sh w Jersey, and c ely be limited iver. No water	woul more orefree on the to par intal	e east shore from tchy areas and	

Tappan Zee 50-bbl Heavy Fuel Oil Spill (Spring-Low Tide) Effects

							-		
			R	esponse Equipmen	t and Plan Activa	tion			
	NCP and		Tier 1	Response Requirer	nents	GF		Ss Activated ays)	
	USCG Type	Tier	1	Tier 2	Tier 3	Rail N	Ailes	River Miles	
	Not major AMPD ³²	n/a	1	n/a	n/a	n/	a	19 river miles Mile 23-18 2016-97 to 2016-101	
		R	esponse	e Overview: Expect	ted Outcomes and	Challeng	es		
	Protective Bo	ooming	Mecl	hanical Recovery	Shoreline Cl	eanup	Other Challenges		
Spill Response	Average river cu	irrents of	Only 8	3% evaporation is	About 70% is an	nticipated	a 19 river miles Mile 23-18 2016-97 to 2016-101 es		
	0.7 kt will reduc	e boom		bated thus	to cause shoreling	ne	heating	oil spill is not	
	effectiveness,		evapor	ration and rapid	contamination s	0	signific	ant danger,	
	containment and	1		ing will minimally	anticipation wou				
	diversionary boo		reduce	e amount that can	a significant sho				
	configurations to			overed	cleanup operation			U	
	angled to prever			nically; mobilize	Perform SCAT;		5	,	
	entrainment and	•		g self-propelled	flushing; some s	substrate	-		
	over; exclusion			iers; set up	removal due to				
	deflection config			ine containment	penetration on s		in water column;		
	to be used to pro	otect		areas with	beaches; oiled d			er, still perform	
	sensitive areas.			m-trucks and	structures; oiled	debris		olumn tracking,	
			skimm	ners.	removal.		and air monitoring.		

Tappan Zee 50-bbl Heavy Fuel Oil Spill (Spring-Low Tide) Response

³² Required only when transferring cargo; underway allisions, no specific AMPD requirement, though a spill response would be undertaken.

¹⁴⁷ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

			, uvy						iigii	nue) Ene		.
	Loca	tion		ource	V	olume		Oil Ty	ре	Season		Tide Stage
Scenario Description	Tappa	n Zee	with	r Allision Bridge utment	4	50 bbl	He	avy Fu	el Oil	Summer		High
Spill		Annu	al Prob	ability Any	where	in Hudson	Rive	er				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volun	ne	US		Hudson
		0.7	32			0.0)93			17.2		0
Conditions	Lat/I		Relea	ase Rate	Da	elease te/Time		1odel l Durati		Winds		Water Temperature
Conditions	41.071 -73.88		Instar	ntaneous		gust 2012 :00pm		30 day	/S	SW / light (<4 kts)		81°F
				Mass Ba	alance	at End of M	Iodel	Run (After 3	0 Days)		
	Fate	Surf	ace	Atmosp	here	Water Columr	1	Sec	diment	Ashor	e	Degraded
	%	0.0	%	8.6%	ว	0.0%		().0%	69.4%)	22.1%
SIMAP	bbl	0		4		0			0	35		11
Modeling Results			Spatial	Extent of	Expos	ure over Th	resh	old (U	p to 30	Days After Sp	oill)	
	Water	· (Volum	e) – Eco	ological	Surf	ace (Area x	Day	s Expo	osed)	Shore	eline	(Length)
	Who			ssolved		cological		cioeco		Ecologica		Socioeconomic
	(1 n ≤100			01 mg/l)		0 g/m ²) mi ² -days		(0.01 g) 65 mi ²		(100 g/m ²) 3 mi)	(1 g/m ²) 13 mi
	<100 gal 5 mil gal 1.65 mi ² -days 1.65 mi ² -days Shoreline Exposure by Shore Type (Miles over Ecolo						-	I4)	15 111			
	Bee	drock		Jnconsolid Rock	•	Sand 1				or Timber		artificial Shore
	0.1	16 mi		2.97 mi	0 mi			().26 mi		0 mi	
		Brac	kish/Est	tuarine We	etland I	land Habitats Exposed (Miles			les over	Ecological Th	rest	old)
Ecological Shoreline	Salt	marsh		pper Inter		Lower In	-		Ph	ragmites	Sl	nrub/Scrub and
Exposures				Mix		M			V	Vetland	Fo	rested Wetland
	Ĺ) mi		0 mi		01			-	0 mi		0 mi
		ŀ				-				logical Thres		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idai		ragmites Vetland		nrub/Scrub and prested Wetland
	C) mi		0 mi		0 1	mi			0 mi		0 mi
										onse Operatio		
Socioeconomic Impacts	of conce oil, inclu (about 3 would be Tarrytov Addition Addition	rn for soo Iding resi miles). R e most af vn to Yor Ial impac	omic effects odor. SCA e parks, man n the west s ough the oi be experience fishing adv	s; shore T opera rinas, b shore fr ling of ced in c	front marina ations and c eaches, indu om Nyack t shorelines v other towns	as, be leanu istry, o Alp voulc along	eaches, p woul comm pine, N l likely g the riv	parks, a ld be foo ercial pr ew Jerso be limi ver. No	nd real estate cused on areas	woul more orefi east reas voul	and tarballs. d be affected.	

Tappan Zee 50-bbl Heavy Fuel Oil Spill (Summer-High Tide) Effects

]	Response Equip	oment	and Plan	Activation					
	NCP and	Ti	ier Re	esponse Require	ement	S	GRPs/	GRS (7 d	Ss Activated ays)			
	USCG Type	Tier 1		Tier 2	1	Fier 3	Rail Miles		River Miles			
	Not major AMPD ³³	n/a		n/a		5 river miles Mile 27-22 2016-98 to 2016						
		Re	spons	se Overview: Ez	xpecte	ted Outcomes and Challenges						
	Protective Bo	ooming	Me	chanical Recove	ery	Shore	ine Cleanup	(Other Challenges			
Spill Response	Average river ct 0.7 kt will reduc effectiveness, containment and diversionary bo configurations t angled to preven entrainment and over; exclusion deflection confi to be used to pro- sensitive areas.	ee boom d om o be nt splash and gurations	antici evapo sprea reduc be re- mech floati skimi shore boom	9% evaporation ipated thus oration and rapid ding will minim ce amount that ca covered hanically; mobili ing self-propelle mers; set up eline containmen h areas with um-trucks and mers	ł ally an ze d	to cause s contamin anticipati a signific cleanup o Perform S flushing; removal o penetratio beaches;	ation so on would be for ant shoreline peration. SCAT; wetland some substrate	heat sign weth chal weth may pote in th in w how	nmability during a ing oil spill is not ificant danger, land access may be lenge; disturbance of lands during response cause effects; intial for entrainment his scenario is for 0% vater column; vever, still perform er column tracking, air monitoring.			

Tappan Zee 50-bbl Heavy Fuel Oil Spill (Summer-High Tide) Response

³³ Required only when transferring cargo; underway allisions, no specific AMPD requirement, though a spill response would be undertaken.
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			Juvy							ide) Elle	010	
~ .	Loca	tion		ource	V	olume		Oil Ty	pe	Season		Tide Stage
Scenario Description	Tappa	n Zee	with	r Allision Bridge utment	-	50 bbl	Не	avy Fu	el Oil	Summer		Low
Spill		Annu	al Prob	ability Any	where	in Hudson	Rive	er				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any	Volume)	$\mathbf{S}_{\mathbf{I}}$	pill of Type	and	Volun	ne	US		Hudson
		0.7	/32			0.0)93			17.2		0
Conditions	Lat/I	Lon	Relea	ase Rate	Da	lelease te/Time		1odel 1 Durati		Winds		Water Temperature
Conditions	41.0 -73.88	07195 8333	Instar	ntaneous		gust 2012 :00am		30 day	ys	SW / light (<4 kts)		81°F
				Mass Ba	alance	at End of M	lodel	Run ((After 3	0 Days)		
	Fate	Surf	face	Atmosp	here	Water Columr		Se	diment	Ashor	e	Degraded
	%	0.0	%	8.1%	,	0.0%		(0.0%	69.8%	,	22.1%
SIMAP Modeling	bbl	C)	4		0			0	35		11
Results			Spatial	Extent of	Expos	ure over Th	resh	old (U	p to 30	Days After Sp	oill)	
	Water	· (Volum	e) – Eco	ological	Surface (Area x Days			s Exp	osed)	l) Shor		(Length)
		le Oil		ssolved		cological			nomic	Ecologica		Socioeconomic
	(1 n ≤100			01 mg/l) nil gal		$\frac{10 \text{ g/m}^2}{\text{mi2-days}}$		(0.01 g 56 mi2		<u>(100 g/m²</u> 5 mi)	(1 g/m ²) 8 mi
	(100	<100 gal 5 mil gal 1.56 mi2-days 1.56 mi2-days Shoreline Exposure by Shore Type (Miles over Ecolo								I4)	0 111	
	Bee	Shoreline Expo Bedrock Unconsol Rocl				Sand				or Timber		artificial Shore
	0.1	16 mi		4.68 mi	i 0 mi			().42 mi		0 mi	
		Brac	kish/Es	tuarine We	etland Habitats Exposed (Miles o			les over	Ecological Th	iresl	nold)	
Ecological Shoreline	Salt	marsh		pper Inter		Lower In	ntert		Ph	ragmites	SI	nrub/Scrub and
Exposures				Mix		M			V	Vetland	Fo	orested Wetland
	Ĺ) mi		0.05 mi		01		<i>e</i> 11	F	0 mi		0 mi
		ł				-				logical Thres) 1rub/Scrub and
	Catta	il Marsh		pper Inter Mix	uaai	Lower In M		Idai		ragmites Vetland		rested Wetland
	C) mi		0 mi		0 1	mi			0 mi		0 mi
			Potent	ial Socioec	onomi	c Impacts fi	rom S	Spill a	nd Resp	onse Operati	ons	
Socioeconomic Impacts	of conce oil, inclu (about 5 would be Ferry, th may be e precautio	rn for so iding resi miles). F e most af ough the experience	omic effects odor. SCA e parks, man n the west s of shoreline: her towns a	s; shore T oper rinas, b shore in s would long th	efront marina ations and c beaches, indu n Orangetow l likely be li he river. No	as, be leanu istry, n, an miteo water	eaches, p wou comm d on th d to par intake	parks, a ld be foo ercial pr ne east sl tchy area es would	nd real estate cused on areas roperty, and sh hore from Slee	woul mor oref py H Add ddit		

Tappan Zee 50-bbl Heavy Fuel Oil Spill (Summer-Low Tide) Effects

		- 7 -					1*	
				Response Equipme	nt and Plan Activ			
	NCP and		Tier l	Response Requirer	nents	GR		Ss Activated ays)
	USCG Type	Tier	1	Tier 2	Tier 3	Rail M	liles	River Miles
	Not major AMPD ³⁴	n/a		n/a	n/a	n/a		8 river miles Mile 24-32 2016-98 to 2016-91
		R	espons	se Overview: Expe	cted Outcomes an	d Challeng	es	
	Protective E	Booming	Mee	chanical Recovery	Shoreline C	leanup	Ot	her Challenges
Cull Decrease	Average river of	currents of	Only	8% evaporation is	About 70% is a	anticipated	Flamm	ability during a
Spill Response	0.7 kt will redu	ice boom	antici	ipated thus	to cause shorel	ine	heating	g oil spill is not
	effectiveness,		evapo	oration and rapid	contamination	so	signifi	cant danger,
	containment ar			ding will minimally				d access may be
	diversionary be			e amount that can	a significant sh			nge; disturbance of
	configurations			covered	cleanup operat			ds during
	angled to preve			anically; mobilize	Perform SCAT			se may cause
	entrainment an	•		ng self-propelled	flushing; some			; potential for
	over; exclusion			mers; set up	removal due to			iment in this
	deflection conf			line containment	penetration on			io is for 0% in
	to be used to p			areas with	beaches; oiled			column; however,
	sensitive areas.			um-trucks and	structures; oile	a aebris		rform water
			skimı	mers.	removal.		monito	n tracking, and air pring.

Tappan Zee 50-bbl Heavy Fuel Oil Spill (Summer-Low Tide) Response

³⁴ Required only when transferring cargo; underway allisions, no specific AMPD requirement, though a spill response would be undertaken.

¹⁵¹ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

		. ,			(ie) Ellec			
Loca	tion			V	olume		Oil Ty	pe	Season		Tide Stage	
Tappa	n Zee	with	Bridge	4	50 bbl	He	avy Fu	iel Oil	Winter		High	
	Annu	al Prob	ability Any	ywhere	in Hudson	Rive	er					
Spi	ll of Typ	e (Any	Volume)	S	pill of Type	and	Volun	ne	US		Hudson	
	0.7	32			0.0)93			17.2		0	
		Relea	ase Rate	Da	te/Time				Winds		Water Temperature	
		Instar		8	:00am			, 	(4-18 kts)	ate	35°F	
			Mass Ba	alance		lode	Run	(After 3	0 Days)			
Fate	Surf	ace	Atmospl	here		1	Se	diment	Ashore	e	Degraded	
%	0.0	%	6.1%	, ?				0.0%	71.7%	1	22.2%	
bbl	0		3		0	0			36		11	
		Spatial	Extent of	Expos	ure over Th	` -			Days After Sp	pill)		
Water	· (Volum	e) – Eco	ological	Surf	face (Area x		-				(Length)	
(1 mg/l) (0.001 mg/l)										Socioeconomic (1 g/m ²)		
10 mi	l gal				mi ² -days	0.	14 mi^2	-days	1 mi		9 mi	
	Shoreline Exposure by Shore Type (Miles over Ecological Threshold)											
Be	drock	τ	Unconsolida Rock	San			h	Mud	or Timber	Α	rtificial Shore	
C) mi		0.94 mi	0 mi				0.1 mi		0 mi		
	Brac	kish/Es	tuarine We	etland	Habitats Ex	cpose	ed (Mi	les over	Ecological Th	resh	old)	
Salt	marsh	U	pper Inter Mix	tidal			idal				rub/Scrub and rested Wetland	
C) mi		0 mi		0 1	mi			0 mi		0 mi	
	ł	reshwa	ter Wetlan	nd Hab	itats Expos	ed (N	Ailes o		_			
Catta	il Marsh	U	pper Inter Mix	tidal			idal				rub/Scrub and rested Wetland	
0) mi		0 mi		0 1	mi			0 mi		0 mi	
		Potent	ial Socioec	onomi	c Impacts fi	rom	Spill a	nd Resp	oonse Operatio	ons		
of conce oil, inclu (about 1 would be Hastings water int	rn for so iding resi mile). R e most af s-on-Hud takes wo	cioecono due and iverside fected o son to Y 1ld be af	omic effects odor. SCA parks, mari n the west s Yonkers. Ad ffected. Add	s; shore T oper inas, be shore fr ditiona ditional	front marina ations and cleaches, indus rom Nyack to l impacts ma precautiona	as, be leanu stry, o o Alp ay be ary fi	eaches, ip wou comme pine, N e exper shing a	parks, a ld be foo ercial pro ew Jerso ienced in	and real estate v cused on areas operty, and sho ey, and on the o n other towns a	woul more orefro east s along	d be affected by e heavily oiled ont real estate shore from the river. No	
	Tappa Spi Spi Lat/ 41.0' -73.8 Fate % bbl Whol (1 n 10 mi Bee (1 Salt (1 Salt (1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	Spill of Typ 0.7 0.7 Lat/Lon 41.07195 .73.833 -73.8333 Fate Surf Fate Surf % Colspan="2" Water Volum Water Volum Water Volum Water Volum Water Volum Monor II Brac Saltmarsh Saltmarsh Gattait Marsh O mi Interview II Marset stoo of concer for soo oil, including resi (about 1 mile). Ri would be most af Hastings-on-Hud water intakes would w	Tappan ZeeTake with AbAnnue Versammen Annue Ve	Tanker Allision with Bridge AbutmentTanker Allision with Bridge AbutmentAnnuAnnuSpill of Type Inter Tope Inter (1 mg/l)InstancousMass BaAtmospiMass BaFateSurser AtmospiMass BaFateSurser (1 mg/l)Mass Ba%Atmospi%Mass Ba%Atmospi%Mass Ba%Mass Ba%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%% <th cols<="" td=""><td>Tanker Allision with Bridge AbutmentTanker Allision with Bridge AbutmentInstance Spill of Type (Auge)Spill of Type (Auge) O.2000Spill of Type (Auge) O.2000Auge) Auge) Auge) Auge)Spill of Type (Auge) Auge) Auge)Auge) Auge) Auge) Auge) Auge)Auge) Auge) Auge) Auge) Auge)Auge) Auge) Auge) Auge) Auge)Auge) Auge) Auge)Auge) Auge) Auge) Auge)Auge) Auge) Auge) Auge) Auge)Auge) Auge)<br< td=""><td>Tanker Allision with Bridge Abutment 50 bbl Tanker Allision with Bridge Abutment 50 bbl Annual Fride Spill of Type (Amy Volume) Spill of Type Spill of Type (Amy Volume) Spill of Type Spill of Type (Amy Volume) Spill of Type Spill of Type (Amy Volume) Spill of Type Colspan="2">One Lat/Lon Release Date/Time All All All All All All All All All All</td><td>Tappan ZeeTanker Allision with Bridge Abutment50 bblHeAnnual Probability Anywhere in Hudson RiveSpill of Type (Any Volume)Spill of Type andSpill of Type (Any Volume)Spill of Type andO.093Lat/LonRelease Rate Date/TimeNote: Spill of Type and41.07195 -73.88333Instantaneous1 January 2012 $8:00am$Note: Spill of Type and41.07195 -73.88333Instantaneous1 January 2012 $8:00am$Note: Spill of Type andMass Balnet at End of ModelFateSurfaceNote: Spill of Type and$000\%$$0.0\%$$6.1\%$$0.0\%$Doto: Spill Surface (Area X DayWater (Volume) - EcologicalSurface (Area X DayWhole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 gal)Surface (Area X DayWhole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 gal)Surface (Area X DayBedrockUnconsolidated RockSand BeacO mi0.94 mi0 miO mi0 mi0 miGaitmarshUpper Intertial MixLower Intert MixO mi0 mi0 miO mi0 mi0 miO mi0 mi0 miMole Oil (1 mg/l)0 miMole Oil (1 mg/l)0 miO mi0 miO mi0 miO mi0 miMixMixM</br></br></br></br></br></br></td><td>Tappan ZeeTanker Allision with Bridge Abutment50 bblHeavy FuInterval Annual Probability Anywhere in Hudson RiverSpill of Type (Any Volume)Spill of Type and Volum0.0930.093Lat/LonRelease RateModel Date/TimeModel Durat41.07195 -73.88333Instantaneous1 January 2012 $8:00am$30 datMass Balance at End of Model Run of ColumnSeeMass Balance at End of Model I ColumnSee$\%$0.0%6.1%0.0%0Spatial Extent of Exposure over Threshold (U Water (Volume) – EcologicalSurface (Area x Days ExpWhole Oil 10 mil galDissolved <100 gal</td></br<></td></th> Ecological 0.14 mi ² daysSocioeco 0.14 mi ² BedrockUnconsolidated RockSand BeachSand Beach0 mi0 mi0 mi0 mi0 miFrestwater Wetland Habitats Exposed (Miles over Mix0 mi0 mi0 mi0 miOterutial Socioeco- (I mg/I)(Upper Intertidal MixMinor impacts to vessel traffic from response operations. 9 miles of o from response operations. 9 mil	<td>Tanker Allision with Bridge AbutmentTanker Allision with Bridge AbutmentInstance Spill of Type (Auge)Spill of Type (Auge) O.2000Spill of Type (Auge) O.2000Auge) Auge) Auge) Auge)Spill of Type (Auge) Auge) Auge)Auge) Auge) Auge) Auge) Auge)Auge) Auge) Auge) Auge) Auge)Auge) Auge) Auge) Auge) Auge)Auge) Auge) Auge)Auge) Auge) Auge) Auge)Auge) Auge) Auge) Auge) Auge)Auge) Auge)<br< td=""><td>Tanker Allision with Bridge Abutment 50 bbl Tanker Allision with Bridge Abutment 50 bbl Annual Fride Spill of Type (Amy Volume) Spill of Type Spill of Type (Amy Volume) Spill of Type Spill of Type (Amy Volume) Spill of Type Spill of Type (Amy Volume) Spill of Type Colspan="2">One Lat/Lon Release Date/Time All All All All All All All All All All</td><td>Tappan ZeeTanker Allision with Bridge Abutment50 bblHeAnnual Probability Anywhere in Hudson RiveSpill of Type (Any Volume)Spill of Type andSpill of Type (Any Volume)Spill of Type andO.093Lat/LonRelease Rate Date/TimeNote: Spill of Type and41.07195 -73.88333Instantaneous1 January 2012 $8:00am$Note: Spill of Type and41.07195 -73.88333Instantaneous1 January 2012 $8:00am$Note: Spill of Type andMass Balnet at End of ModelFateSurfaceNote: Spill of Type and$000\%$$0.0\%$$6.1\%$$0.0\%$Doto: Spill Surface (Area X DayWater (Volume) - EcologicalSurface (Area X DayWhole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 gal)Surface (Area X DayWhole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 gal)Surface (Area X DayBedrockUnconsolidated RockSand BeacO mi0.94 mi0 miO mi0 mi0 miGaitmarshUpper Intertial MixLower Intert MixO mi0 mi0 miO mi0 mi0 miO mi0 mi0 miMole Oil (1 mg/l)0 miMole Oil (1 mg/l)0 miO mi0 miO mi0 miO mi0 miMixMixM</br></br></br></br></br></br></td><td>Tappan ZeeTanker Allision with Bridge Abutment50 bblHeavy FuInterval Annual Probability Anywhere in Hudson RiverSpill of Type (Any Volume)Spill of Type and Volum0.0930.093Lat/LonRelease RateModel Date/TimeModel Durat41.07195 -73.88333Instantaneous1 January 2012 $8:00am$30 datMass Balance at End of Model Run of ColumnSeeMass Balance at End of Model I ColumnSee$\%$0.0%6.1%0.0%0Spatial Extent of Exposure over Threshold (U Water (Volume) – EcologicalSurface (Area x Days ExpWhole Oil 10 mil galDissolved <100 gal</td></br<></td>	Tanker Allision with Bridge AbutmentTanker Allision with Bridge AbutmentInstance Spill of Type (Auge)Spill of Type (Auge) O.2000Spill of Type (Auge) O.2000Auge) Auge) Auge) Auge)Spill of Type (Auge) Auge) Auge)Auge) Auge) Auge) Auge) Auge)Auge) Auge) Auge) Auge) Auge)Auge) Auge) Auge) Auge) Auge)Auge) Auge) Auge)Auge) Auge) Auge) Auge)Auge) Auge) Auge) Auge) Auge)Auge) <br< td=""><td>Tanker Allision with Bridge Abutment 50 bbl Tanker Allision with Bridge Abutment 50 bbl Annual Fride Spill of Type (Amy Volume) Spill of Type Spill of Type (Amy Volume) Spill of Type Spill of Type (Amy Volume) Spill of Type Spill of Type (Amy Volume) Spill of Type Colspan="2">One Lat/Lon Release Date/Time All All All All All All All All All All</td><td>Tappan ZeeTanker Allision with Bridge Abutment50 bblHeAnnual Probability Anywhere in Hudson RiveSpill of Type (Any Volume)Spill of Type andSpill of Type (Any Volume)Spill of Type andO.093Lat/LonRelease Rate Date/TimeNote: Spill of Type and41.07195 -73.88333Instantaneous1 January 2012 $8:00am$Note: Spill of Type and41.07195 -73.88333Instantaneous1 January 2012 $8:00am$Note: Spill of Type andMass Balnet at End of ModelFateSurfaceNote: Spill of Type and$000\%$$0.0\%$$6.1\%$$0.0\%$Doto: Spill Surface (Area X DayWater (Volume) - EcologicalSurface (Area X DayWhole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 gal)Surface (Area X DayWhole Oil (1 mg/l)Dissolved (0.001 mg/l)Ecological (10 gal)Surface (Area X DayBedrockUnconsolidated RockSand BeacO mi0.94 mi0 miO mi0 mi0 miGaitmarshUpper Intertial MixLower Intert MixO mi0 mi0 miO mi0 mi0 miO mi0 mi0 miMole Oil (1 mg/l)0 miMole Oil (1 mg/l)0 miO mi0 miO mi0 miO mi0 miMixMixM</br></br></br></br></br></br></td><td>Tappan ZeeTanker Allision with Bridge Abutment50 bblHeavy FuInterval Annual Probability Anywhere in Hudson RiverSpill of Type (Any Volume)Spill of Type and Volum0.0930.093Lat/LonRelease RateModel Date/TimeModel Durat41.07195 -73.88333Instantaneous1 January 2012 $8:00am$30 datMass Balance at End of Model Run of ColumnSeeMass Balance at End of Model I ColumnSee$\%$0.0%6.1%0.0%0Spatial Extent of Exposure over Threshold (U Water (Volume) – EcologicalSurface (Area x Days ExpWhole Oil 10 mil galDissolved <100 gal</td></br<>	Tanker Allision with Bridge Abutment 50 bbl Tanker Allision with Bridge Abutment 50 bbl Annual Fride Spill of Type (Amy Volume) Spill of Type Spill of Type (Amy Volume) Spill of Type Spill of Type (Amy Volume) Spill of Type Spill of Type (Amy Volume) Spill of Type Colspan="2">One Lat/Lon Release Date/Time All	Tappan ZeeTanker Allision with Bridge Abutment 50 bblHeAnnual Probability Anywhere in Hudson RiveSpill of Type (Any Volume)Spill of Type andSpill of Type (Any Volume)Spill of Type andO.093Lat/LonRelease Rate Date/TimeNote: Spill of Type and41.07195 -73.88333Instantaneous1 January 2012 $8:00am$ Note: Spill of Type and41.07195 -73.88333Instantaneous1 January 2012 	Tappan ZeeTanker Allision with Bridge Abutment50 bblHeavy FuInterval Annual Probability Anywhere in Hudson RiverSpill of Type (Any Volume)Spill of Type and Volum0.0930.093Lat/LonRelease RateModel Date/TimeModel Durat41.07195 -73.88333Instantaneous1 January 2012 $8:00am$ 30 datMass Balance at End of Model Run of ColumnSeeMass Balance at End of Model I ColumnSee $\%$ 0.0%6.1%0.0%0Spatial Extent of Exposure over Threshold (U Water (Volume) – EcologicalSurface (Area x Days ExpWhole Oil 10 mil galDissolved <100 gal	Tanker Allision with Bridge AbutmentSo bblHeavy Fuel OilTanker Allision with Bridge AbutmentSo bblHeavy Fuel OilAnnual Probability Anywhere in Hudson RiverSpill of Type (Any Volume)Spill of Type and Volume0.093Lat/LonRelease Bate/TimeModel Run Date/Time41.07195 -73.88333Instantaneous1 January 2012 $8:00am$ So daysTateSurfaceAtmosphereWater ColumnSediment Column	Tappan ZeeTanker Allision with Bridge Abutment 50 bblHeavy Fuel OilWinterHeavy Fuel OilWinterHistorical (2Spill of Type (Any Volume)Spill of Type and VolumeUse0.732 0.093 17.2Lat/LonRelease RateReleaseModel Run Date/TimeModel Run DurationWinds41.07195 -7.3.88.33Instantaneous1 January 2012 8:00am30 daysSouth / moder (4-18 kts)Mass Balance at End of Model Run (After 30 Days)FateSurfaceAtmosphereWater ColumnSedimentAshor (4-18 kts) $\%$ 0.0% 6.1% 0.0% 0.0% 71.7% bbl 0 3 0 0 36 Span="4">Span="4">SurfaceAtmosphereWater ColumnSedimentAshor (4-18 kts) $\%$ 0.0% 6.1% 0.0% 0.0% 71.7% bbl 0 3 0 0 36 Span="4">Span="4">Release Kate ColumnSocieconomic (0.0%Cological (1.17\% $\%$ 0.0% 6.1% 0.0% 0.0% 71.7% bbl 0 3 0 0 3 0 0 Water (Volume) - Ecological	Tappan ZeeTanker Allision with Bridge Abutment 50 bbl Heavy Fuel OilWinterHistorical Ann (2000-Spill of Type (Any Volume)Spill of Type and VolumeHistorical Ann (2000-Spill of Type (Any Volume)Spill of Type and VolumeHistorical Ann (2000-O.7320.09317.2Lat/LonRelease RateReleaseModel Run DurationWinds41.07195 -7.38.833Instantaneous11 January 2012 $8:00am$ South / moderate $(4:18 \text{ kts})$ Mass Balance at End of Model Run (After 30 Days)FateSurfaceAtmosphereWater ColumnSedimentAshore $\%$ 0.0%6.1%0.0%0.0%71.7%Obl030 daysSouth / moderate (Column $\%$ 0.0%6.1%0.0%0.0%71.7%bl030036SourfaceWhole OilDissolvedEcological (0.00 mg/)Socieconomic (0.01 g/m²)Ecological (100 g/m²)Socieconomic (0.01 g/m²)Ecological (100 g/m²)Noteline Exposure by Shore Type (Miles over Ecological Threshold)BaedrockMader TimelMatMatMixMix </td

Tappan Zee 50-bbl Heavy Fuel Oil Spill (Winter-High Tide) Effects

		,			0			
			l	Response Equipmer	nt and Plan Activa	tion		
	NCP and		Tier	Response Requiren	nents	GF		s Activated ays)
	USCG Type	Tier	1	Tier 2	Tier 3	Rail N	Ailes	River Miles
	Not major AMPD ³⁵	n/a		n/a	n/a	n/a		3 river miles Mile 24-21 2016-97 to 2016-98
		R	espons	e Overview: Expec	ted Outcomes and	Challeng	es	
	Protective B	Booming	Mee	chanical Recovery	Shoreline Cl	eanup	Oth	er Challenges
Spill Response	esponse Protective Booming Average river currents 0.7 kt will reduce boor effectiveness, containment and diversionary boom configurations to be angled to prevent entrainment and splash over; exclusion and deflection configuration to be used to protect sensitive areas. Potential ice condition may negatively impact			6% evaporation is pated thus pration and rapid ding will minimally e amount that can covered anically; mobilize ng self-propelled ners; set up line containment areas with um-trucks and ners. tial ice conditions	About 72% is an to cause shorelin contamination so anticipation word a significant sho cleanup operation Perform SCAT; flushing; some so removal due to penetration on so beaches; oiled d structures; oiled removal.	ne o lld be for reline on. wetland ubstrate andy ock	heating signific wetland challen wetland respons effects; entraim scenarie water c still per	ability during a oil spill is not ant danger, d access may be ge; disturbance of ds during se may cause potential for ment in this o is for 0% in olumn; however, form water tracking, and air ring.
	boom performa	ance.		negatively impact ner operations				

Tappan Zee 50-bbl Heavy Fuel Oil Spill (Winter-High Tide) Response

³⁵ Required only when transferring cargo; underway allisions, no specific AMPD requirement, though a spill response would be undertaken.
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Spil Lat/J 41.07 73.88 tte % bl	Annu Annu Il of Typ 0.7 Lon 7195	Tanker with Abu al Proba e (Any V 32 Relea Instant cace	Volume) ase Rate taneous	where Sj R Da 1 Jan 2 ulance	olume 50 bbl in Hudson pill of Type 0.0 celease te/Time uary 2012 ::30am at End of M	Hea Rive and V 193 M	Volume Iodel Run Duration			000-2	Tide Stage Low Low Hal Frequency 2015) Hudson 0 Water Temperature
Spil Lat/J 41.07 73.88 tte % bl	Annua Il of Typ 0.7 Lon 7195 3333 Surf 0.0	with Abu al Proba e (Any V 32 Relea Instant acce	Bridge atment ability Any Volume) ase Rate taneous Mass Ba	where Sp R Da 1 Jan 2 Ilance	in Hudson pill of Type 0.0 celease te/Time uary 2012 c:30am	Rive and 93 M	r Volume Iodel Run Duration		Historical A (20 US 17.2 Winds	000-2	al Frequency 2015) Hudson 0 Water
Lat/I 41.07 -73.88 nte % bl	ll of Typ 0.7 2.0n 7195 3333 Surf 0.0	e (Any V 32 Relea Instan	Volume) ase Rate taneous Mass Ba	Sj R Da 1 Jan 2 slance	pill of Type 0.0 elease te/Time wary 2012 ::30am	and ` 93 M 1	Volume Iodel Run Duration		(20 US 17.2 Winds	000-2	2015) Hudson 0 Water
Lat/I 41.07 -73.88 nte % bl	0.7 Lon 7195 3333 Surf 0.0	Relea Instan	ase Rate taneous Mass Ba	R Da 1 Jan 2 alance	0.0 celease te/Time uary 2012 ::30am	93 M I	Iodel Run Duration		17.2 Winds	unta	0 Water
41.07 -73.88 nte % bl	Lon 7195 3333 Surf 0.0	Relea Instan	taneous Mass Ba	Da 1 Jan 2 alance	telease te/Time wary 2012 ::30am	M	Duration		Winds	unto.	Water
41.07 -73.88 nte % bl	7195 3333 Surf 0.0	Instan ⁻	taneous Mass Ba	Da 1 Jan 2 alance	te/Time wary 2012 :30am]	Duration			ata.	
-73.88 nte % bl	3333 Surf 0.0	ace	Mass Ba	2 alance :	:30am		20 4	S	outh / modor	ata	
% bl Vater	0.0				at End of M		30 days		(4-18 kts)	ale	35°F
% bl Vater	0.0		Atmospl			odel	Run (Aft	er 30	Days)		T
bl Vater		%		liere	Water Column	l	Sedim	ent	Ashore	e	Degraded
Vater	0		6.1%)	0.0%				71.7%		22.2%
			3		0		0		36		11
		Spatial	Extent of	Expos	ure over Th	Threshold (Up to 30			ays After Sp	ill)	
Water (Volume) - EcoWhole OilDis			ological	Surf	ace (Area x	Day	s Exposed	l)	Shore	line	(Length)
(1 m			ssolved 01 mg/l)		cological 0 g/m ²)		cioeconon 0.01 g/m ²		Ecological (100 g/m ²)		Socioeconomic (1 g/m ²)
10 mi	l gal	<10	00 gal	0.08	mi2-days	0.0	8 mi2-day	'S	2 mi		5 mi
	Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
Bee	drock	ι	Rock			Beach	h N	/Iud o	r Timber	А	rtificial Shore
0.1	6 mi		1.3 mi		0 1	mi		0.16 mi		0 mi	
	Brac	kish/Est	tuarine We	tland		-		ver E	cological Th	resh	old)
Salt	marsh	U	pper Inter Mix	tidal	Lower In M		dal		agmites etland		rub/Scrub and rested Wetland
0	mi		0 mi		0 1	ni		() mi		0 mi
	F								-		
Cattai	l Marsh	U	pper Inter Mix	tidal			dal				rub/Scrub and rested Wetland
0	mi		0 mi		0 1	ni		() mi		0 mi
							=				
of concern for socioeconomic effec oil, including residue and odor. SC (about 2 miles). Riverside parks, m would be most affected on the wes Hastings-on-Hudson to Yonkers. A					front marina ations and cl eaches, indu om Nyack to l impacts ma precautiona	as, be leanuj istry, o Alp ay be ay fis	aches, par p would b commerci ine, New experienc shing advis	ks, an e focu al pro Jersey ed in	d real estate v sed on areas perty, and sho r, and on the e other towns a	woul more orefr east s llong	d be affected by heavily oiled ont real estate shore from the river. No
n i o	or in once inclu out 2 ld be	or impacts to oncern for soc including resi iut 2 miles). R ld be most affi tings-on-Huds er intakes wou	Freshwa attail Marsh 0 mi 0 mi Potent or impacts to vessel t oncern for socioecond including residue and out 2 miles). Riverside ld be most affected o tings-on-Hudson to Y er intakes would be af	Freshwater Wetlan attail Marsh Upper Inter Mix 0 mi 0 mi Potential Socioeccons Omi or impacts to vessel traffic from oncern for socioeconomic effects oncluding residue and odor. SCA out 2 miles). Riverside parks, mail ld be most affected on the west stings-on-Hudson to Yonkers. Ader intakes would be affected. Adder	Freshwater Wetland Hab attail Marsh Upper Intertidal Mix 0 mi 0 mi Potential Socioeconomic or impacts to vessel traffic from respon oncern for socioeconomic effects; shore including residue and odor. SCAT oper- ut 2 miles). Riverside parks, marinas, b ld be most affected on the west shore fr rings-on-Hudson to Yonkers. Additional er intakes would be affected. Additional	Freshwater Wetland Habitats Expose attail Marsh Upper Intertidal Mix Lower In Mix 0 mi 0 mi 0 m 0 mi 0 mi 0 m Potential Socioeconomic Impacts fr or impacts to vessel traffic from response operation oncern for socioeconomic effects; shorefront marina including residue and odor. SCAT operations and cl ut 2 miles). Riverside parks, marinas, beaches, indu ld be most affected on the west shore from Nyack to tings-on-Hudson to Yonkers. Additional impacts may er intakes would be affected. Additional precautiona	Freshwater Wetland Habitats Exposed (Mattail Marsh Upper Intertidal Mix Lower Intertial Mix 0 mi 0 mi 0 mi 0 mi 0 mi 0 mi Potential Socioeconomic Impacts from S S or impacts to vessel traffic from response operations. 5 m 5 m or impacts to vessel traffic from response operations. 5 m 5 m oncern for socioeconomic effects; shorefront marinas, be 6 m including residue and odor. SCAT operations and cleanu 0 ut 2 miles). Riverside parks, marinas, beaches, industry, Id be most affected on the west shore from Nyack to Alp 10 minustry rings-on-Hudson to Yonkers. Additional impacts may be 10 m	Freshwater Wetland Habitats Exposed (Miles over attail Marsh Upper Intertidal Mix Lower Intertidal Mix 0 mi 0 mi 0 mi Potential Socioeconomic Impacts from Spill and F or impacts to vessel traffic from response operations. 5 miles of sho oncern for socioeconomic effects; shorefront marinas, beaches, par including residue and odor. SCAT operations and cleanup would be ut 2 miles). Riverside parks, marinas, beaches, industry, commerci ld be most affected on the west shore from Nyack to Alpine, New 3 tings-on-Hudson to Yonkers. Additional impacts may be experience er intakes would be affected. Additional precautionary fishing advise	Freshwater Wetland Habitats Exposed (Miles over Ecolor attail Marsh Upper Intertidal Mix Lower Intertidal Mix Phra Mix 0 mi 0 mi	Freshwater Wetland Habitats Exposed (Miles over Ecological Thresh attail Marsh Upper Intertidal Mix Lower Intertidal Mix Phragmites Wetland 0 mi 0 mi 0 mi 0 mi Potential Socioeconomic Impacts from Spill and Response Operation Portential Socioeconomic effects; shorefront marinas, beaches, parks, and real estate vincluding residue and odor. SCAT operations and cleanup would be focused on areas areas ut 2 miles). Riverside parks, marinas, beaches, industry, commercial property, and shild be most affected on the west shore from Nyack to Alpine, New Jersey, and on the crings-on-Hudson to Yonkers. Additional impacts may be experienced in other towns a	Freshwater Wetland Habitats Exposed (Miles over Ecological Threshold) attail Marsh Upper Intertidal Mix Lower Intertidal Mix Phragmites Wetland Sh Fo 0 mi 0 mi 0 mi 0 mi 0 mi Fo or impacts to vessel traffic from response operations. 5 miles of shoreline would be oiled a oncern for socioeconomic effects; shorefront marinas, beaches, parks, and real estate woul including residue and odor. SCAT operations and cleanup would be focused on areas more ut 2 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefri ld be most affected on the west shore from Nyack to Alpine, New Jersey, and on the east st stings-on-Hudson to Yonkers. Additional impacts may be experienced in other towns along er intakes would be affected. Additional precautionary fishing advisories would likely be in

Tappan Zee 50-bbl Heavy Fuel Oil Spill (Winter-Low Tide) Effects

				Response Equipme						
	NCP and		Tier	Response Requiren	ients	GR		Ss Activated ays)		
	USCG Type	Tier 1	l	Tier 2	Tier 3	Rail M	liles	River Miles		
	Not major AMPD ³⁶	n/a		n/a	n/a	n/a	n/a 3 river mi Mile 24-2 2016-96 2016-97			
		R	espons	se Overview: Expec	ted Outcomes an	d Challeng	es			
	Protective B	Booming	Me	chanical Recovery	Shoreline C	leanup	Ot	her Challenges		
Spill Response	Protective Booming Average river currents of 0.7 kt will reduce boom		antici evapo sprea reduc be re- mech floati skimi shore boom vacu skimi vacu skimi	6% evaporation is ipated thus oration and rapid ding will minimally ee amount that can covered annically; mobilize ng self-propelled mers; set up eline containment a areas with um-trucks and mers. ntial ice conditions negatively impact mer operations	About 72% is a to cause shorel contamination anticipation we a significant sh cleanup operat Perform SCAT flushing; some removal due to penetration on beaches; oiled structures; oile removal.	ine so buld be for ioreline ion. '; wetland substrate sandy dock	heating signific wetlan challer wetlan may ca potenti in this in wate howev water of	hability during a g oil spill is not cant danger, d access may be nge; disturbance of ds during response ause effects; ial for entrainment scenario is for 0% er column; er, still perform column tracking, monitoring.		

Tappan Zee 50-bbl Heavy Fuel Oil Spill (Winter-Low Tide) Response

 ³⁶ Required only when transferring cargo; underway allisions, no specific AMPD requirement, though a spill response would be undertaken.
 155 Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

Yonkers Anchorage 155,000-bbl Gasoline Spill

Yonkers Anchorage 155,000-bbl Gasoline Spill (Spring-High Tide) Effects

	Loca		-	ource		olume	- -	Oil Ty		Season		Tide Stage
Scenario Description	Yon Ancho		collisio	anker on/allision chorage	155	5,000 bbl		Gasoli	ne	Spring		High
C::11		Annu	al Proba	ability Any	where	e in Hudson	Rive	er			Annu 000-2	al Frequency 2015)
Spill Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volun	ne	US		Hudson
		0.7	32			0.000	0001	5		0		0
Conditions	Lat/	-		ase Rate	Da	telease te/Time		Aodel I Durati	ion	Winds		Water Temperature
Conditions	40.9′ -73.9			0 bbl/hr r 4 hrs		oril 2012 :00am		30 day	ys	North / mode (10-20 kts)		50°F
				Mass B	alance	at End of N	lode	l Run	(After 30) Days)		
	Fate	Surf	face	Atmosp	here	Water Columr	1	See	diment	Ashor	e	Degraded
	%	0.0	%	91.89	%	0.1%		().1%	0.0%		3.9%
SIMAP Modeling	bbl	0)	142,30	56	122			226	48		6,109
Results			Spatia	Extent of	Expos	sure over Tl	nresł	nold (U	p to 30 l	Days After Sp	oill)	
		r (Volum		8			•	Days Exposed) Socioeconomic				(Length)
	Who (1 n	le Oil ng/l)		ssolved 01 mg/l)		cological l0 g/m ²)		ocioeco (0.01 g		Ecologica (100 g/m ²		Socioeconomic (1 g/m ²)
	82,445	0		4 mil gal		ni ² -days		0 mi^2 -o		0 mi	/	63 mi
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
	Be	drock	ι	Jnconsolid Rock	ated	Sand	Beac	ch	Mud	or Timber	A	rtificial Shore
	() mi						0 mi		0 mi		
Ecological		Brac			etland Habitats Exposed					0		
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M	ntert lix	tidal		agmites etland		rub/Scrub and rested Wetland
P	0.2	26 mi		0 mi		0				0 mi		0 mi
]				-				logical Thres		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		lidal		agmites etland		rub/Scrub and rested Wetland
	() mi		0 mi		0	mi			0 mi		0 mi
			Potent	ial Socioec	onomi	c Impacts f	rom	Spill a	nd Resp	onse Operati	ons	
										ghout river fo		
										pacts to vesse niles of shorel		fic. Evacuation ould be oiled
Socioeconomic	above th	e level o	f concer	n for socio	econon	nic effects; s	hore	front m	arinas, b	eaches, parks,	and 1	real estate
Impacts	would b	e affected	l by oil,	including r	esidue	and odor. S	CAT	operat	ions and	cleanup woul	d be f	focused on areas
										stry, commer		roperty, and Jersey, and on
	the east	shore fro	m Yonk	ers to Man	hattan.	Additional i	impa	cts may	y be expe	rienced in oth	er tov	wns along the
						Additional p e vicinity of			y fishing	advisories wo	ould li	ikely be
	montute		ani parts		/1 111 UI	e viennty of	une s	pm.				

Yonkers Anchorage 155,000-bbl Gasoline Spill (Spring-High Tide) Response

			R	esponse Equipmen	t and Plan Activatio	n		
	NCP and		Tier	Response Requirer	nents	G		Ss Activated ays)
	USCG Type	Tier 1 (24	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rai	l Miles	River Miles
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/c 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	n/a		18 river miles Mile 18-0 2016-113
					ed Outcomes and C	halleng	jes	1
	Protective I	Booming	Mech	nanical Recovery	Shoreline Clean	nup	Othe	r Challenges
Spill Response	Protective Booming Average river currents of >1 kt will reduce boom effectiveness, containment and diversionary boom configurations to be angled to prevent		92% e rapid s reduce be reco mecha floatin shoreli boom a vacuur skimm Consic Comm perforn operati pruden	vaporation and preading will amount that can overed nically; mobilize g self-propelled ers; set up ne containment areas with n-trucks and ers. leration by Unified and of not ming skimming ions may be at in light of the ial flammability	Minimal % is antici to cause shoreline contamination. Perf SCAT; wetland flux some substrate rem due to penetration of sandy beaches; contaminated debri removal; BTEX res may remain in shor sediment.	ipated form shing; oval on s sidue	Flammab gasoline extremely danger as vapors to public he in the spi public to danger; e firefighti on scene wetland a challenge wetlands may caus potential of small column r water int concerns spilled m evaporati atmosphe	bility during a spill is an y significant s are high BTEX o responder and eath and safety ill areas; notify potential fire ensure ng resources are and mobilized; access may be e; disturbance of during response se effects; for entrainment % in water may not lead to ake and fish kill since most

		ichorage 155,000-bbi Gasoline Spill (Spring-Low Tide) Effects											
	Loca	tion	So	ource	V	olume		Oil Ty	pe	Season		Tide Stage	
Scenario Description	Yonl Ancho		collisio	anker on/allision chorage	155	5,000 bbl		Gasoli	ne	Spring		Low	
Spill		Annu	al Prob	ability Any	where	in Hudson	Rive	er		Historical Annual Frequency (2000-2015)			
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volum	e	US		Hudson	
		0.7	732			0.000				0		0	
Conditions	Lat/	Lon	Relea	ase Rate	Da	lelease te/Time		/lodel I Durati		Winds		Water Temperature	
Conditions	40.97 -73.90			50 bbl/hr er 4 hrs		pril 2012 0:00am		30 da	ys	North / moder (4-16 kts)	rate	50°F	
				Mass Ba	alance	at End of M	Iodel	Run (After 3	30 Days)			
	Fate	Surf	face	Atmosp	here	Water Columr	1	Sec	liment	Ashore	e	Degraded	
	%	0.0)%	93.49	%	0.2%		C	0.1%	0.1%		3.2%	
SIMAP Modeling	bbl	3	;	144,80)7	233			137	82		4,923	
Results			Spatial	Extent of	Expos	ure over Th	resh	old (Uj	p to 30	Days After Sp	ill)		
		· (Volum		_		Surface (Area x		-				(Length)	
	Who (1 n	le Oil 19/1)		ssolved 01 mg/l)		cological 0 g/m ²)		cioeco (0.01 g/		Ecological (100 g/m ²)	1	Socioeconomic (1 g/m ²)	
	60,959			91 mil gal		mi ² -days		6 mi^2 -c		1 mi	,	83 mi	
			Shorel	ine Exposi	ure by	Shore Type	(Mi	les ove	r Ecolo	gical Threshol	ld)		
	Be	Bedrock		Jnconsolid Rock	ated	Sand	Beac	h	Mud	or Timber	А	rtificial Shore	
	0) mi		0.05 mi	0 mi				0.1 mi 0 mi				
Ecological		Brac			tland Habitats Exposed (Miles over				8		-		
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		Phragmites Wetland		Shrub/Scrub and Forested Wetland	
Laposures	0.0	68 mi		0 mi		0 1	mi			0 mi		0 mi	
		I				_				logical Thresh			
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		ragmites Vetland		rub/Scrub and rested Wetland	
	0) mi		0 mi		0 1	mi			0 mi		0 mi	
						=		-		onse Operatio			
	days; ev	acuations	s and pre	cautionary	clearar	nce zones mi	ight c	cause fu	urther in	ighout river for npacts to vesse niles of shoreli	l traf	fic. Evacuation	
Socioeconomic	above th	e level o	f concern	n for socioe	econom	ic effects; sl	noref	ront ma	arinas, b	eaches, parks,	and	real estate	
Impacts										cleanup would stry, commercia		focused on areas	
	shorefro	nt real es	tate wou	ild be most	affecte	d on the we	st sho	ore from	n Alpino	e to Hoboken,	New	Jersey, and on	
		shorefront real estate would be most affected on the west shore from Alpine to Hoboken, New Jersey, and on the east shore from Yonkers to Manhattan. Additional impacts may be experienced in other towns along the river. No water intakes would be affected. Additional precautionary fishing advisories would likely be											
						e vicinity of				,		·-,	

Yonkers Anchorage 155,000-bbl Gasoline Spill (Spring-Low Tide) Effects

_	J	,			t and Plan Activatio		/		
	NCP and		Tier	Response Requirem	nents	G	RPs/ GRS (7 d	Ss Activated ays)	
	USCG Type	Tier 1 (24	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles	
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/d 3,750 bbl s	300 per system lay	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	1	n/a	22 river miles Mile 22-0 2016-98 to 2016-113	
			esponse	Overview: Expecte	ed Outcomes and C	hallenge			
	Protective H	Booming	Mecl	nanical Recovery	Shoreline Clear	nup	Othe	r Challenges	
Spill Response	ReProtective BoomingAverage river currents of >1 kt will reduce boom effectiveness, containment and diversionary boom configurations to be angled to prevent entrainment and splash over; exclusion and deflection configurations to be used to protect sensitive areas.Consideration by Unified Command to not containing gasoline might be prudent to eliminate gas vapor		rapid s reduce be reco mecha floatin skimm shoreli boom vacuu skimm Consid Comm perform operati pruder	nically; mobilize g self-propelled iers; set up ine containment areas with n-trucks and iers. deration by Unified and of not ming skimming ions may be at in light of the ial flammability	Minimal % is antic to cause shoreline contamination. Per SCAT; wetland flu some substrate rem due to penetration of sandy beaches; contaminated debri removal; BTEX res may remain in shor sediment.	form shing; oval on s sidue	gasoline extremel danger a BTEX vi responde health ar spill area to potent ensure fi resource and mob access m disturbar during re cause eff for entra % in wat not lead and fish since mo material into the a	er and public ad safety in the as; notify public tial fire danger; refighting s are on scene ilized; wetland ay be challenge; nee of wetlands esponse may fects; potential inment of small ter column may to water intake kill concerns ost spilled is evaporating atmosphere; water column , and air	

Yonkers Anchorage 155,000-bbl Gasoline Spill (Spring-Low Tide) Response

		aye	ge 155,000-bbi Gasoline Spill (Summe				I-IIIgii I	lue	e) Ellecis			
	Loca	tion		ource	V	olume		Oil Ty	pe	Season		Tide Stage
Scenario Description	Yonl Ancho		collisio	anker on/allision chorage	155	5,000 bbl		Gasoli	ine	Summer		High
Spill		Annu	al Prob	ability Any	where	in Hudson	Rive	er		Historical Annual Frequency (2000-2015)		
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volun	ne	US		Hudson
		0.7	732			0.000				0		0
Conditions	Lat/	Lon	Relea	nse Rate		Release te/Time		/lodel Durati		Winds		Water Temperature
Conditions	40.97 -73.90			0 bbl/hr r 4 hrs		gust 2012 :00pm		30 day	ys	SW / light (<4 kts)		81°F
				Mass Ba	alance	at End of M	lode	l Run ((After 30	Days)		
	Fate	Surf	face	Atmosp	here Water Column		ı	Se	diment	Ashor	e	Degraded
	%	0.0)%	93.99	%	1.4%		(0.1%	0.0%		4.6%
SIMAP Modeling	bbl	0)	145,47	70	2,237			105	54		7,134
Results			Spatial	Extent of	Expos	ure over Th	resh	old (U	p to 30 I	Days After Sp	oill)	
		r (Volum		0		Surface (Area x						(Length)
	Who (1 n	le Oil		ssolved 01 mg/l)		cological 10 g/m ²)		cioeco (0.01 g	$\frac{1}{(m^2)}$	Ecological (100 g/m ²)		Socioeconomic (1 g/m ²)
	64,687			8 mil gal		mi ² -days		2 mi^2 -0		3 mi	,	31 mi
			Shorel	ine Exposı	ure by	Shore Type	e (Mi	les ove	er Ecolog	ical Thresho	ld)	
	Be	Bedrock		Jnconsolida Rock	ated	Sand 1	Beac	h	Mud	or Timber	A	rtificial Shore
	0) mi	2.76 mi 0 mi			(0.1 mi 0 mi					
Ecological		Brac					-			Ecological Th		
Shoreline Exposures	Salt	tmarsh	U	pper Inter Mix	tidal					Phragmites Wetland		nrub/Scrub and prested Wetland
Laposures	0.2	21 mi		0 mi		0 1	mi		0	42 mi		0 mi
		I				-				ogical Thresh		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		rub/Scrub and rested Wetland
	() mi		0 mi		0 1	mi			0 mi		0 mi
								-		onse Operatio		
Socioeconomic Impacts	Response operations may cause major impacts to ports in Albany and throughout river for at least several days; evacuations and precautionary clearance zones might cause further impacts to vessel traffic. Evacuation of populated areas could cause effects on communities and businesses. 31 miles of shoreline would be oiled above the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and real estate would be affected by oil, including residue and odor. SCAT operations and cleanup would be focused on areas more heavily oiled (about 3 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Orangetown to Englewood Cliffs, New Jersey, and on the east shore from Hastings-on-Hudson to Riverdale. Additional impacts may be experienced in other towns along the river. No water intakes would be affected. Additional precautionary fishing advisories would likely be instituted for certain parts of the river in the vicinity of the spill.											

Yonkers Anchorage 155,000-bbl Gasoline Spill (Summer-High Tide) Effects

Yonkers Anchorage 155,000-bbl Gasoline Spill (Summer-High Tide) Response

			R	esponse Equipment	t and Plan Activatio	n			
	NCP and		Tier	Response Requiren	nents	G		Ss Activated ays)	
	USCG Type	Tier 1 (24	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles	
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/c 3,750 bbl s	300 per system lay torage	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage		n/a	7 river miles Mile 22-15 2016-98 to 2016-103	
			-	-	ed Outcomes and C	0			
	Protective I	8		nanical Recovery	Shoreline Clear	-		r Challenges	
Spill Response	Average river >1 kt will redu effectiveness, containment and diversionary b configurations angled to preve entrainment ardover; exclusion deflection com- to be used to p sensitive areas Consideration Command to r containing gas might be prude eliminate gas v concentrations potential flammincidents.	nd oom to be ent ad splash n and figurations rotect by Unified not oline ent to zapor and	rapid s reduce be recc mecha floatin skimm shoreli boom vacuun skimm Consid Comm perforn operat pruder	nically; mobilize g self-propelled uers; set up ine containment areas with n-trucks and uers. deration by Unified and of not ming skimming ions may be at in light of the iai flammability	Minimal % is antic to cause shoreline contamination. Per SCAT; wetland flu some substrate rem due to penetration of sandy beaches; contaminated debri removal; BTEX res may remain in shor sediment.	form shing; oval on s sidue	gasoline extremel danger a BTEX vi responde health ar spill area to potent ensure fi resource and mob access m disturbar during re cause eff for entra >1 % in may not intake ar concerns spilled m evaporat atmosph	bility during a spill is an ly significant s are high apors to er and public nd safety in the as; notify public tial fire danger; refighting s are on scene ilized; wetland hay be challenge; nee of wetlands esponse may fects; potential inment of small water column lead to water nd fish kill s since most naterial is ing into the ere; perform lumn tracking, nonitoring.	

TUIKEIS A	Anchorage		55,0		Gas	onne S	hiii	(30) Ellecis
	Loca	tion	So	ource	V	olume		Oil Ty	pe	Season		Tide Stage
Scenario Description	Yonl Ancho		collisio	anker on/allision chorage	155	,000 bbl		Gasoli	ne	Summer		Low
Spill		Annu	al Prob	ability Any	where	in Hudson	Rive	er				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any '	Volume)	SI	oill of Type	and	Volun	ne	US		Hudson
		0.7	/32			0.000				0		0
	Lat/	Lon	Relea	ase Rate		elease te/Time		lodel l Durati		Winds		Water Temperature
Conditions	40.97 -73.90			0 bbl/hr r 4 hrs		gust 2012 :00am		30 day	/s	SW / light (<4 kts)		81°F
				Mass Ba	alance	at End of M	lode	Run (After 30			
	Fate	Surf	face	Atmosp	here Water Column			See	diment	Ashore		Degraded
	%	0.0	%	94.19	6	1.4%		().1%	0.0%		4.3%
SIMAP Modeling	bbl	0)	145,85	58	2,227			161	45		6,708
Results			Spatial	Extent of	Expos	ure over Th	resh	old (U	p to 30 I	Days After Sp	ill)	
		· (Volum	,	0		ace (Area x	-	-				(Length)
	Who (1 n	le Oil 19/1)		ssolved 01 mg/l)		cological 0 g/m ²)		cioeconomic (0.01 g/m ²)		Ecological (100 g/m ²)		Socioeconomic (1 g/m ²)
	61,736			57 mil gal		mi ² -days		8 mi ² -0		2 mi	,	23 mi
			Shorel	ine Exposı	ire by	Shore Type	(Mi	les ove	r Ecolog	ical Thresho	ld)	
	Be	Bedrock		Jnconsolid: Rock	ated	Sand 1	Beac	h	Mud	or Timber	А	rtificial Shore
	0) mi		1.77 mi	i 0 mi				0	0.21 mi 0 mi		
Ecological		Brac					xposed (Miles over Ecological			_		
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal	Lower In M		idal		Phragmites Wetland		nrub/Scrub and prested Wetland
Exposures	0) mi		0 mi		0 1	mi		0	.05 mi		0 mi
		ŀ				-				ogical Thresh		
	Catta	il Marsh	U	pper Inter Mix	tidal	Lower In M		idal		agmites etland		nrub/Scrub and prested Wetland
	0) mi		0 mi		0 1	mi			0 mi		0 mi
						-		-	-	onse Operatio		
										ghout river for pacts to vesse		east several ffic. Evacuation
	of popul	ated area	s could	cause effect	ts on co	ommunities a	and b	ousines	ses. 23 n	iles of shoreli	ine v	vould be oiled
Socioeconomic										eaches, parks,		real estate focused on areas
Impacts	more hea	avily oile	d (about	t 2 miles). H	Riversic	le parks, ma	rinas	, beach	nes, indus	stry, commerc	ial p	roperty, and
		more heavily oiled (about 2 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Nyack to Fort Lee, New Jersey, and on the east shore from Hastings-on-Hudson to Riverdale. Additional impacts may be experienced in other towns										
	along the	e river. N	o water	intakes wo	uld be a	affected. Ad	ditio	nal pre	cautiona			es would likely
						the vicinity				-		

Yonkers Anchorage 155,000-bbl Gasoline Spill (Summer-Low Tide) Effects

Yonkers Anchorage 155,000-bbl Gasoline Spill (Summer-Low Tide) Response

			esponse Equipment	and Plan Activatio	11			
NCP and		Tier	Response Requiren	nents	G	RPs/ GRS (7 d	s Activated ays)	
USCG Type	Tier 1 (24	hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles	
Major WCD	25,000 ft bo 1,000 ft + 3 skimming s 1,875 bbl/d 3,750 bbl st	00 per ystem ay torage	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage		n/a	7 river miles Mile 22-10 2016-98 to 2016-105	
	R	esponse	Overview: Expected	ed Outcomes and Cl	hallenge			
Protective B	0		nanical Recovery	Shoreline Clear	-		r Challenges	
Average river co offectiveness, containment an liversionary bo configurations ingled to preve entrainment and over; exclusion leflection confi o be used to pr ensitive areas. Consideration I Command to ne containing gase night be prude diminate gas v concentrations	currents of ce boom ad bom to be ent d splash a and figurations rotect by Unified ot bline ent to rapor and	94% ev rapid s reduce be recc mechai floatin skimm shoreli boom a vacuur skimm Consid Comm perforn operati pruden	vaporation and preading will amount that can overed nically; mobilize g self-propelled ers; set up ne containment areas with n-trucks and ers. leration by Unified and of not ning skimming ions may be it in light of the ial flammability	Minimal % is antic to cause shoreline contamination. Perf SCAT; wetland flu some substrate rem due to penetration of sandy beaches; contaminated debri removal; BTEX res may remain in shor sediment.	form shing; oval on s sidue	Flammat gasoline extremel danger a: BTEX va responde health an spill area to potent ensure fi resource: and mob access m disturbar during re cause eff for entra >1 % in may not intake an concerns spilled m	oility during a spill is an y significant s are high	
cont nigh clim conc oote	aining gase ht be prude inate gas v centrations ntial flamm	aining gasoline ht be prudent to inate gas vapor centrations and ntial flammable	aining gasolineoperatiht be prudent toprudentinate gas vaporpotenticentrations andissues.ntial flammable	aining gasolineoperations may beht be prudent toprudent in light of theinate gas vaporpotential flammabilitycentrations andissues.	aining gasolineoperations may beht be prudent toprudent in light of theinate gas vaporpotential flammabilitycentrations andissues.ntial flammable	aining gasolineoperations may beht be prudent toprudent in light of theinate gas vaporpotential flammabilitycentrations andissues.ntial flammable	aining gasolineoperations may because effht be prudent toprudent in light of thefor entrainate gas vaporpotential flammability>1 % incentrations andissues.may notintial flammableconcernsdents.potential flammability	

TUTIKETS A	Anchorage		55,0		Gas	onne 3	hiii	(• • •	mer	nigii nu	e)	LIIECIS
	Loca	tion	So	ource	V	olume		Oil Ty	pe	Season		Tide Stage
Scenario Description	Yonl Ancho		collisio	anker on/allision chorage	155	5,000 bbl		Gasoli	ine	Winter		High
Spill		Annu	al Prob	ability Any	where	in Hudson	Rive	er				ual Frequency 2015)
Probability	Spi	ll of Typ	e (Any '	Volume)	S	pill of Type	and	Volun	ne	US		Hudson
		0.7	32			0.000				0		0
Conditions	Lat/	Lon	Relea	nse Rate		elease te/Time		/lodel Durati		Winds		Water Temperature
Conditions	40.97 -73.90		· · · ·	0 bbl/hr r 4 hrs		uary 2012 :00am		30 da <u>y</u>	ys	South / moder (4-18 kts)	ate	35°F
				Mass Ba	alance	at End of M	Iodel	Run (After 3	0 Days)		
	Fate	Surf	face	Atmosp	here	Water Columr	1	See	diment	Ashore	e	Degraded
	%	0.0	%	93.89	6	0.3%		(0.2%	0.1%		4.1%
SIMAP Modeling	bbl	5	i	145,40	51	441			322	204		6,291
Results			Spatial	Extent of	Expos	ure over Th	resh	old (U	p to 30	Days After Sp	ill)	
		· (Volum	,	0		ace (Area x	-	-		Shorelin		—
	Who (1 n	le Oil		ssolved 01 mg/l)		cological 0 g/m ²)		cioeco (0.01 g	nomic /m ²)	Ecological (100 g/m ²)		Socioeconomic (1 g/m ²)
	68,167			66 mil gal		ni ² -days		$\frac{1}{3}$ mi ² -d		3 mi	,	103 mi
		Shoreline Exposure by Shore Type (Miles over Ecological Threshold)										
	Be	Bedrock		Unconsolida Rock		Sand 1	Beac	h	Mud	or Timber	A	rtificial Shore
	0) mi		1.72 mi	0 mi).16 mi		0 mi		
Ecological		Brac				land Habitats Exposed (Miles over						
Shoreline Exposures	Salt	marsh	U	pper Inter Mix	tidal					Phragmites Wetland		rub/Scrub and rested Wetland
Exposures	0.8	88 mi		0 mi		0 1	mi			0 mi		0 mi
		I								logical Thresh		
	Cattail March									rub/Scrub and rested Wetland		
	() mi		0 mi		0 1	mi			0 mi		0 mi
						-		-		onse Operatio		
										ighout river for		east several fic. Evacuation
	of popul	ated area	s could	cause effec	ts on co	ommunities a	and b	ousines	ses. 103	miles of shore	line	would be oiled
Socioeconomic		f populated areas could cause effects on communities and businesses. 103 miles of shoreline would be oiled bove the level of concern for socioeconomic effects; shorefront marinas, beaches, parks, and real estate rould be affected by oil, including residue and odor. SCAT operations and cleanup would be focused on areas										
Impacts												
	more heavily oiled (about 3 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Orangetown to Alpine, New Jersey, and											lew Jersey, and
										perienced in o advisories wo		towns along the
						vicinity of			/ iisning	auvisories wo	uia I	ikely be
			-			-		-				

Yonkers Anchorage 155,000-bbl Gasoline Spill (Winter-High Tide) Effects

Yonkers Anchorage 155,000-bbl Gasoline Spill (Winter-High Tide) Response

		Response Equipment and Plan Activation											
	NCP and		Tier	Response Requirer	nents	G	RPs/ GRS (7 d	Ss Activated ays)					
	USCG Type	Tier 1 (24	4 hrs)	Tier 2 (48 hrs)	Tier 3 (72 hrs)	Rail	Miles	River Miles					
	Major WCD	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/d 3,750 bbl s	300 per system lay torage	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage		n/a	4 river miles Mile 21-17 2016-98 to 2016-101					
			<u> </u>	-	ed Outcomes and Cl								
	Protective I				Shoreline Clear	ոսթ		r Challenges					
Spill Response	Average river currents of >1 kt will reduce boom effectiveness, containment and diversionary boom configurations to be angled to prevent entrainment and splash over; exclusion and deflection configurations to be used to protect sensitive areas. Consideration by Unified Command to not containing gasoline might be prudent to eliminate gas vapor concentrations and potential flammable incidents. Potential ice conditions may negatively impact boom deployment.		rapid s reduce be reco mecha floatin skimm shorel: boom vacuus skimm Consid	vaporation and spreading will a amount that can overed nically; mobilize g self-propelled eers; set up ine containment areas with m-trucks and eers. deration by Unified and of not	Minimal <1% is anticipated to cause shoreline contamin Perform SCAT; we flushing; some sub- removal due to penetration on sand beaches; contamina debris removal; BT residue may remain shore sediment.	ation. etland strate ly nted EX	gasoline extremel danger a BTEX vi responde health ar spill area to potent ensure fi resource and mob access m	bility during a spill is an y significant s are high apors to er and public nd safety in the as; notify public tial fire danger; refighting s are on scene ilized; wetland aay be challenge; nee of wetlands					
			operat pruder potent issues. Potent may no	ming skimming ions may be at in light of the ial flammability ial ice conditions egatively impact ing operations.			cause eff for entra <1 % in may not intake ar concerns spilled n evaporat atmosph water co	esponse may fects; potential inment of small water column lead to water ad fish kill s since most naterial is ing into the ere; perform lumn tracking, monitoring.					

Location Source Volume Oil Type Scenario Yonkers Tanker Tanker	Season	Tide Stage										
Vonkers Tunker		0										
DescriptionY onkers Anchoragecollision/allision at anchorage155,000 bblGasoline	Winter	Low										
Annual Probability Anywhere in Hudson River	Historical Annual Frequency (2000-2015)											
Spill Spill of Type (Any Volume) Spill of Type and Volume	US	Hudson										
0.732 0.0000015	0	0										
Conditions Lat/Lon Release Rate Release Model Run Date/Time Duration	Winds	Water Temperature										
40.97341 38,750 bbl/hr 1 January 2012 30 days S -73.90003 over 4 hrs 2:30am 30 days S	South / moderate (4-18 kts)	35°F										
Mass Balance at End of Model Run (After 30												
Fate Surface Atmosphere Water Column Sediment	Ashore	Degraded										
% 0.0% 93.1% 0.3% 0.2%	0.1%	5.0%										
SIMAP Modeling bbl 8 144,294 410 357	199	7,677										
Results Spatial Extent of Exposure over Threshold (Up to 30 D	Days After Spill)											
Water (Volume) – Ecological Surface (Area x Days Exposed)		e (Length)										
Whole Oil (1 mg/l) Dissolved (0.001 mg/l) Ecological (10 g/m ²) Socioeconomic (0.01 g/m ²)	Ecological (100 g/m ²)	Socioeconomic (1 g/m ²)										
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	2 mi	95 mi										
Shoreline Exposure by Shore Type (Miles over Ecolog	ical Threshold)											
Bedrock Unconsolidated Rock Sand Beach Mud of	or Timber	Artificial Shore										
0.05 mi 1.61 mi 0 mi 0.	.16 mi	0 mi										
Ecological Brackish/Estuarine Wetland Habitats Exposed (Miles over H												
Shoreline Saltmarsh Upper Intertidal Lower Intertidal Phr		Shrub/Scrub and Forested Wetland										
0.62 mi 0 mi 0 mi	0 mi	0 mi										
Freshwater Wetland Habitats Exposed (Miles over Ecolo	-											
Cattail March		Shrub/Scrub and orested Wetland										
0 mi 0 mi 0 mi	0 mi	0 mi										
Potential Socioeconomic Impacts from Spill and Respo												
Response operations may cause major impacts to ports in Albany and throug days; evacuations and precautionary clearance zones might cause further imp												
of populated areas could cause effects on communities and businesses. 95 m	iles of shoreline	would be oiled										
Socioeconomic above the level of concern for socioeconomic effects; shorefront marinas, be												
Impacts would be affected by oil, including residue and odor. SCAT operations and o more heavily oiled (about 2 miles). Riverside parks, marinas, beaches, indus												
	more heavily oiled (about 2 miles). Riverside parks, marinas, beaches, industry, commercial property, and shorefront real estate would be most affected on the west shore from Orangetown to Fort Lee, New Jersey, and											
		on the east shore from Hastings-on-Hudson to Manhattan. Additional impacts may be experienced in other towns along the river. No water intakes would be affected. Additional precautionary fishing advisories would										
on the east shore from Hastings-on-Hudson to Manhattan. Additional impact	ts may be experie	enced in other										

Yonkers Anchorage 155,000-bbl Gasoline Spill (Winter-Low Tide) Effects

	NCP and USCG Type Major WCD Protective B Average river of		4 hrs) oom 300 per system lay torage	Response Requiren Tier 2 (48 hrs) 25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	Tier 3 (72 hrs) 25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day 15,000 bbl storage	Rail	RPs/ GRS (7 d Miles	River Miles 12 river miles Mile 22-10
	Major WCD Protective B Average river of	25,000 ft b 1,000 ft + 3 skimming s 1,875 bbl/d 3,750 bbl s R	oom 300 per system lay torage	25,000 ft boom 1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	25,000 ft boom 1,000 ft + 300 per skimming system 7,500 bbl/day			12 river miles Mile 22-10
	WCD Protective B Average river of	1,000 ft + 3 skimming s 1,875 bbl/d 3,750 bbl s R	300 per system lay torage	1,000 ft + 300 per skimming system 3,750 bbl/day 7,500 bbl storage	1,000 ft + 300 per skimming system 7,500 bbl/day	r	n/a	Mile 22-10
	Average river o		esponse	Overview, Evneet	ě.			2016-98 to 2016-106
	Average river o	Booming		Over view: Expecti	ed Outcomes and C	hallenge	es	
				nanical Recovery	Shoreline Clear	nup		r Challenges
Spill Response d d C a e o d ttt s c C C C C C C C C C C C C C C C C C C	1 kt will redu- effectiveness, containment ar diversionary be configurations angled to preve entrainment an over; exclusion deflection confi- to be used to pro- sensitive areas. Consideration 1 Command to n containing gase might be prude eliminate gas v concentrations potential flamm incidents.	ce boom nd bom to be ent d splash n and figurations rotect by Unified ot oline ent to vapor and nable onditions	93% er rapid s reduce be recc mecha floatin skimm shoreli boom a vacuur skimm Consic Comm perfort operati pruden potenti issues. Potent may no	vaporation and preading will amount that can overed nically; mobilize g self-propelled ers; set up ne containment areas with n-trucks and ers. leration by Unified and of not ning skimming ions may be it in light of the ial flammability	Minimal <1% is anticipated to cause shoreline contamin Perform SCAT; we flushing; some sub removal due to penetration on sand beaches; contamina debris removal; BT residue may remain shore sediment.	e ation. etland strate ly ated EX	Flammal gasoline extremel danger a vapors to public he in the sp public to danger; e firefighti on scene wetland challeng wetlands may caus potential of small column n water int concerns spilled m evaporat atmosphe	pility during a spill is an y significant s are high BTEX presponder and ealth and safety ill areas; notify potential fire

Yonkers Anchorage 155,000-bbl Gasoline Spill (Winter-Low Tide) Response

	Location	So	urce	Volume	Oil Type	Seas	son	Tide
Scenario Description	Yonkers Anchorage	collisio	anker n/allision chorage	155,000 bbl	Gasoline	Summ	er	High
6:II		An	inual Pro	bability		Histori	cal Annual (2000-20)	l Frequency 15)
Spill Probability	Spill of Type	e in Hud	son	Spill Volum	e in Hudson	US		Hudson
	0.7	32		0.00	00015	0		0
	Lat/Lon	Releas	se Rate	Release Date/Time	Run Duration	Wir	nds	Temperature
Conditions	41.91833 -73.96333		0 bbl/hr 4 hrs	1 August 2012 2:00pm	30 days	SW / light (<4 kts)		81°F
Fire/Explosion	Pool Fire	• 1 • • •		Pool Fire	Vapor			oud Explosion
Probabilities	Probability/Inc 0.08	ident		robability 00000012	Explosion/ 0.02			obability 0000004
	Emergency	Respon			ion Zone		alth/Safety	
Fire/Explosion Response ³⁷	Very low flash poi spray when fightin inefficient. For small fire: Dry water spray or regg For large fire: Wat regular foam. Do r streams. Move con area if possible wit Fire involving tank loads: Fight fire fro distance or use un holders or monitor containers with flo of water until well • Withdraw immed rising sound from devices or discolor • ALWAYS stay a engulfed in fire. • For massive fire, hose holders or mon this is impossible, area and let fire bu RP will need to act Contracted Fire an Resources. Use of foam pumps/monit foam volumes fitte vessel in river to a needed proximity to	g fire ma chemica ilar foan er spray, tot use st ttainers f thout risk so or car/ om maxi nanned h nozzles. oding qu after fire liately in venting s ration of way fror use unm onitor no withdraw rn. tivate VF d Salvag high cap tors, sign d on a fl pproach	ay be al, CO ₂ , fog or raight from fire c. (trailer mum hose c Cool hantities e is out. case of safety tank. n tanks hanned zzles; if v from RP re pacity hificant oating the	Large Spill • Consider initi. evacuation for a meters (1000 fe Fire • If tank, rail ca is involved in a for 800 meters (directions; also consider initial 800 meters (1/2 directions	at least 300 et). r or tank truck fire, ISOLATE (1/2 mile) in all evacuation for	absorbed th • Inhalation may irritate • Fire will p and/or toxic • Vapors ma suffocation. • Runoff from water may of Protective C • Wear posic contained b (SCBA).	e toxic effec rough skin. or contact or burn ski roduce irrit gases. ay cause diz om fire cont cause pollut clothing tive pressur reathing ap firefighters	with material in and eyes. tating, corrosive zziness or trol or dilution tion. re self- paratus s' protective

Yonkers Anchorage 155,000-bbl Gasoline Spill with Fire/Explosion

³⁷ If concurrent with a spill to the water, see also spill response tables. If there is a fire and/or explosion, some or even most of the oil may be consumed by the fire, reducing the amount of oil that would spill into the river and affect shorelines. In most cases, it would be necessary to conduct at least some oil spill cleanup in addition to fire-fighting, though those operations would be secondary to emergency fire-fighting operations. 168 *Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries*

Safety Impacts	Flammable Distance	Impacts from Fire (Acres)				
		Total	Residential	Commercial	Industrial	Public Use
	1,473 feet	3.1 acres	0 acres	1.6 acres	1.6 acres	0 acres
	Downwind Distance	Impacts from Explosion (Acres)				
		Total	Residential	Commercial	Industrial	Public Use
	0.033 mile	166 acres	103 acres	27 acres	8 acres	27 acres

••	2	
Table 1: Hudson River Study Area West Bank Communities in New Jersey		
Town/Village (County)	Approximate River Miles	
Englewood Cliffs (Bergen)	13 – 15	
Alpine (Bergen)	15 – 21	

Appendix A: Hudson River Communities by River Mile³⁸

Table 2: Hudson River Study Area East Bank Communities in New York			
Town/Village (County)	Approximate River Miles		
Riverdale (Bronx)	14 – 17		
Yonkers (Westchester)	17 – 22		
Hastings-on-Hudson (Westchester)	22 - 24		
Dobbs Ferry (Westchester)	24 – 25		
Irvington ³⁹ (Westchester)	25 – 27		
Tarrytown (Westchester)	27 – 30		
Sleepy Hollow ⁴⁰ (Westchester)	30 - 33		
Scarborough ⁴¹ (Westchester)	33 - 34		
Ossining (Westchester)	33 – 35		
Cortlandt ⁴² (Westchester)	35 - 43, 45 - 52		
Peekskill (Westchester)	43 - 44		
Philipstown ⁴³ (Putnam)	52 - 63		
Beacon (Dutchess)	63 - 65		
Fishkill (Dutchess)	65		
Wappinger ⁴⁴ (Dutchess)	65 - 68		
Poughkeepsie ⁴⁵ (Dutchess)	68 - 75		
Hyde Park ⁴⁶ (Dutchess)	75 – 87		
Rhinebeck ⁴⁷ (Dutchess)	87 – 95		
Red Hook ⁴⁸ (Dutchess)	95 - 103		
Clermont (Columbia)	103 – 105		
Germantown (Columbia)	105 - 109		
Livingston ⁴⁹ (Columbia)	109 – 112		
Hudson (Columbia)	112 – 119		

³⁸ For more information about the riverside features of each community, refer to HROSRA Volume 2.

³⁸ For more information about the riverside features of each community, refer to HROSRA Volum
³⁹ Includes: Ardsley-on-Hudson
⁴⁰ Hudson River adjacent part of Town of Mt Pleasant.
⁴¹ Riverfront part of Briarcliff Manor.
⁴² Includes: Croton-on-Hudson, Crugers, Verplanck, Buchanan, Montrose, and Cortlandt Manor.
⁴³ Includes: Garrison and Cold Spring
⁴⁴ Includes: Chelsea.
⁴⁵ Includes: New Hamburg and Wappingers Falls.
⁴⁶ Includes: Staatsburg
⁴⁷ Includes: Rhinecliff
⁴⁸ Includes: Barrytown, Annandale-on-Hudson, and Tiyoli.

⁴⁸ Includes: Barrytown, Annandale-on-Hudson, and Tivoli.

⁴⁹ Includes: Linlithgo.

¹⁷⁰ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries

Table 2: Hudson River Study Area East Bank Communities in New York		
Town/Village (County)	Approximate River Miles	
Stockport (Columbia)	119 – 123	
Stuyvesant (Columbia)	123 – 132	
Schodack ⁵⁰ (Rensselaer)	132 – 141	
Rensselaer (Rensselaer)	141 – 146	

Table 3: Hudson River Study Area West Bank Communities in New York ⁵¹			
Town/Village (County)	Approximate River Miles		
Orangetown ⁵² (Rockland)	23 - 35		
Haverstraw (Rockland)	35 - 43		
Stony Point ⁵³ (Rockland)	43 - 50		
Highlands ⁵⁴ (Orange)	50 - 58		
Cornwall (Orange)	58-60		
New Windsor (Orange)	60 - 63		
Newburgh (Orange)	63 - 66		
Balmville (Orange)	66 - 67		
Marlboro (Ulster)	67 – 72		
Milton (Ulster)	72 – 73		
Lloyd ⁵⁵ (Ulster)	73 - 80		
Esopus ⁵⁶ (Ulster)	80 - 90		
Kingston (Ulster)	90 - 93		
Ulster ⁵⁷ (Ulster)	93 - 97		
Saugerties ⁵⁸ (Ulster)	97 – 105		
Catskill ⁵⁹ (Greene)	105 – 115		
Athens (Greene)	115 – 122		
Coxsackie (Greene)	122 – 128		
New Baltimore (Greene)	128 – 133		
Coeymans ⁶⁰ (Albany)	133 – 136		
Bethlehem ⁶¹ (Albany)	136 – 145		
Albany (Albany)	145 – 153		

⁵⁰ Includes: Castleton-on-Hudson
⁵¹ Based on most recent data available in Wikipedia or other sources.
⁵² Includes: Piermont and Grand View-on-Hudson, Nyack, and South Nyack.
⁵³ Including: Tomkins Cove.
⁵⁴ Includes: West Point, Highland Falls, and part of Bear Mountain State Park
⁵⁵ Includes: Highland
⁵⁶ Includes: West Park and Port Ewen.
⁵⁷ Includes: East Kingston and Ulster Landing.
⁵⁸ Includes: Glasco and Malden-on-Hudson.
⁵⁹ Includes: Hamburg.
⁶⁰ Includes: Ravena

⁶⁰ Includes: Ravena

⁶¹ Includes: Glenmont

¹⁷¹ Hudson River Oil Spill Risk Assessment Volume 7: Spill Scenario Summaries