Shorelines and Diesel

Rock Platforms (bedrock):

Definition
A common shoreline type with a rocky environment that is both exposed and submerged from tide cycles. Platforms are generally horizontal and collect sediments in crevices and depressions. These are commonly associated with sedimentary bedrock outcrops.

Sediment Characteristics

- Bedrock is impermeable – stranded oil remains on surface or in hollows crevices and tidal pools

Oiling:

Very Exposed and Exposed coasts

- Oil does not usually become stranded due to wave reflection; otherwise it generally washes off rapidly
- Oil may be deposited above the normal wave limit from splashing
- Oil in un-vegetated areas is refloated with the tides, in vegetated areas it is absorbed or trapped and released by currents during flood tides.

Very Sheltered and Sheltered coasts

- Oil is most likely to appear as a band near the last high water mark
- Oil is more persistent due to lower energy waves
- Light oils are more likely to be washed off in a short period of time
- Oil in un-vegetated areas is refloated with the tides, in vegetated areas it is absorbed or trapped and released by currents during flood tides.
- Animals and plants often cover the intertidal rock surfaces and frequent tidal pools

Response Methods

- Natural recovery is the preferred option on **VE, E** coasts especially for small amounts of oil
- Flooding is useful for light oils
- Low pressure, cold water wash for light to medium oils
- High pressure, cold water wash is useful for more viscous oils (higher environmental impact however)
- low-pressure, warm/hot water washing for medium oils
- Manual removal for medium/heavy oils
- Vacuum systems can be used in tidal pools and hollows
- Sorbents can be deployed for light/medium oils (small amounts)
- Dispersants can be used on flooding tide for small amounts of oil
- Shoreline cleaners can be used with flooding/low pressure washing
- Avoid sandblasting, steam cleaning, high pressure warm/hot water wash, and burning as they have high environmental impacts
- Avoid washing oil from the upper intertidal to lower intertidal zones (wash when the lower zones are under water)

- Avoid spraying fresh water on intertidal communities or cutting vegetation

Typical Response Method
Manual removal of debris and manual removal of tide pools, crevices, and cracks using vacuums and sorbents, or low-pressure washing with flooding.

Boulder Beaches

Definition
Boulder beaches are permeable with a stable surface layer

Oiling
Presence of boulder beaches that may have cobbles and pebbles (low sand gradient)

- Can include boulder barricades
- all types of oil can be carried into the sediments
- oil persistence is a function of oil type and wave energy
- light oils may be easily flushed by tides
- stable shore type; animals and plants may be common

Response Methods

- Boulder beaches can be similar to bedrock outcrops so similar surface techniques could be applied but oil can penetrate between boulders
- Natural recovery is the preferred option especially for small amounts of oil
- Flooding can flush mobile oils from the surface and subsurface for collection (more difficult for heavier oils)
- Low-pressure cold water wash can flush oil from the surface and subsurface for collection (more effective for heavier oils than flooding)
- Manual removal is useful for surface oil but not subsurface oil; and is useful for asphalt and tar patches and debris
- Mechanical lifting of boulders for subsurface treatment is affective to avoid leaching oil
- Sorbents are useful for light and medium oils near the beach surface

Typical Response Method
Removal of oiled debris with manual removal of surface oil, or flooding and low pressure washing.

Pebble/Cobble Beach

Definition
Pebble/Cobble beaches are permeable (except to semi-solid oils) with a dynamic unstable surface layer

Oiling

- Usually have the presence of pebble/cobble beaches, often in the upper intertidal.
- Can easily have stranded oil carried into the sediments

- Mobile and unstable surface layer
- Oil less likely to stay stranded at lower tide zones; will be more concentrated on the upper beach
- oil persistence is a function of oil type, penetration depth, and wave energy
- oil-in-sediment amounts are usually very low
- light oils may be flushed out of the surface and subsurface sediments from tidal action but oil penetrating the surface may not be physically reworked frequently
- mobile upper sediments; supports little life

Response Methods

- Natural recovery is preferred for small spills of light oils in **V, E** coasts and remote areas
- Flooding can flush mobile oils from surface and subsurface sediments for collection
- Low-pressure cold washing can flush mobile oil from surface and subsurface sediments (more effective for viscous oils than flooding)
- Manual removal minimizes the amount of oiled and un-oiled sediments that may be collected (not practical for deeply penetrated/buried oil) and is useful for asphalt patches, tar patties and oiled debris in smaller areas
- Mechanical removal of oiled sediment is useful for large amounts of semi solid oils (front-end loaders may be the equipment of choice)
- Sorbents may be helpful for recovering small volumes of light/medium oils
- Mechanical tilling/aeration is appropriate for light oils in surface and subsurface sediments used in combination with surf washing
- Sediment reworking or surf washing is appropriate on exposed coasts after mobile oil is removed or for small areas of oiled sediments (minimizes erosion) but is dependent on availability of wave energy
- Avoid excessive removal of sediment (natural replacements are slow and it could lead to erosion of the beach)
- Avoid large volumes of waste that contain low amounts of oil from sediment removal
- Avoid spreading oil into lower tidal zones or flushing it deeper into sediments

Typical Response Method
Removal of oiled debris followed by manual removal, vacuums, or sorbents on surface oil patches; flooding and low-pressure washing; tilling or aeration followed by surf washing and/or bioremediation

Mixed Sediment Beaches

Definition

- Mixed sediment beaches are permeable for some oils (some medium and all light) and have dynamic and mobile surfaces

Oiling

- Composed of mixed sands, pebbles and cobbles (often coarse sediments with sand subsurface)
- permeable for some oils (some medium and all light) and have dynamic and mobile surfaces (assumes porosity of finest sediments)
- light oils may penetrate a medium/coarse grained sand beach

- oil less like to stay stranded in lower tidal zones and would be re-floated (except very viscous or dense oils) by a rising tide to concentrate on the upper beacasphalt pavements may form in upper zones from medium/heavy oils (oil/sediment conglomerate)
- oil penetrating the surface sediments may not be physically reworked frequently
- protected areas of mixed beaches may support organisms as it is somewhat stable
- natural replacement of oiled sediment occurs at a very slow rate if any

Response Methods

- Natural recovery may be acceptable for small spills, light oils or on exposed coasts/remote areas
- Flooding is non-intrusive and can flush mobile and light oil from surface and subsurface sediments for collection
- Low-pressure, cold water washing can flush mobile oils from surface and subsurface sediments
- Manual removal can be appropriate for removal of surface oiled sediments
- Mechanical removal is useful for a large amount of semi-solid oil (front end loaders would be equipment of choice)
- Sorbents may be useful for small volumes of light/medium oils
- Mechanical tilling/aeration would be useful for light oils in surface/subsurface sediments in combination with surf washing
- Sediment reworking or surf washing is appropriate on exposed coasts after mobile oil is removed; minimizes possiblility of erosion
- Avoid excessive removal of sediment (natural replacements are slow and it could lead to erosion of the beach)
- Avoid large volumes of waste that contain low amounts of oil from sediment removal
- Avoid spreading oil into lower tidal zones or flushing it deeper into sediments
- Avoid flushing that causes the oil to move deeper into the sediments

Typical Response Method
Flooding with trenches or sumps to collect floated oil in combination with vacuum systems

Sand Beaches

Definition

- Sand beaches are permeable for some medium and all light oils; they are dynamic and unstable

Oiling

- Permeable to some medium and all light oils
- Dynamic, mobile, unstable surface layer
- Small pore spaces restrict oil penetration (medium and heavy oils unlikely to reach depth of 25cm; light oils may mix with ground water)
- Light oils can refloat and be transported by changing water levels
- Most oils are most likely to be concentrated on the upper beach due to wave actions
- A few burrowing species can be found
- Natural sediment replacement depends on source and supply conditions

Response Methods

- Natural recovery is preferred for small spills and light oils
- Flooding and Low-pressure, cold water washing can remove light and medium oils
- Manual removal is best for medium and heavy oils
- Mechanical removal is good for long sections of beach
- Heavy equipment (graders) can scrape thin layers of oiled sand
- Sorbents are useful for collecting oil as it washes ashore
- Tilling/aeration, sediment reworking, or surf washing can accelerate weathering of light oils
- Avoid excessive removal of sediment (natural replacements are slow and it could lead to erosion of the beach)
- Avoid mixing clean and oiled sediments
- Avoid large volumes of waste that contain low amounts of oil from sediment removal

Typical Response Method
Flooding or floating oil into lined trenches and sumps along with recovery by vacuums/skimmers, or by mechanical removal followed by surf washing

INFORMATION PROVIDED BY:

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