H.R. _____ / S. _____

THE RECOVER ACT

Restoration of Earth through Complete Operation to Verify Energetic Return

A Comprehensive Federal Bill to Declare a National Environmental Emergency, Halt Hydraulic Fracturing, Mandate Full Ecological Healing of Extraction Sites, Protect Indigenous Consultation Rights, Establish Corporate and Executive Accountability, Fund the Recovery of the Earth, and Guarantee Full Public and International Disclosure

IN THE HOUSE OF REPRESENTATIVES / IN THE SENATE

[Date]

Mr./Ms. _____ introduced the following bill; which was referred to the Committee on _____

A BILL

To declare a national environmental emergency; impose an immediate moratorium on hydraulic fracturing and refracking operations; establish a mandatory, fully-funded healing protocol for every abandoned, orphaned, and improperly closed well in the United States, with a fixed cure window after which land title transfers by quitclaim deed; guarantee indigenous nations a formal right of voice and consultation, with ultimate veto authority held solely by the Indigenous Earth Council acting through its elected President; create binding civil, criminal, and financial accountability for corporations and executives responsible for environmental harm; fund the full restoration of affected land through a dedicated Earth Repair Fund; and require full public, congressional, and international disclosure of this Act and the evidence underlying it.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

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TITLE I — FINDINGS, EVIDENCE, AND DEFINITIONS

SECTION 101. CONGRESSIONAL FINDINGS

Congress finds the following, based on documented evidence:

(1) Over 2 million oil and gas wells have been drilled in the United States.

(2) Over 1 million of these wells have been abandoned without proper remediation.

(3) Over 130,000 documented orphan wells currently have no identifiable responsible party; independent estimates place the true number as high as 800,000 when undocumented and unplugged sites are included.

(4) Zero wells nationwide have been fully healed to ecological restoration standards; current practice ends at cement plugging, not restoration.

(5) Hydraulic fracturing operations have caused documented contamination of groundwater in multiple states, including the introduction of fracking fluid, heavy metals (arsenic, barium, lead), and naturally occurring radioactive material (NORM) into aquifers.

(6) Induced seismic activity from fracking and wastewater injection has measurably increased earthquake frequency in previously stable regions, as documented by the U.S. Geological Survey.

(7) Cement well plugs degrade over a period of 50 to 100 years, after which contamination pathways reopen; current law treats a degrading plug as a permanent solution.

(8) Indigenous nations have documented instances of extraction proceeding on or near ancestral and sacred land without free, prior, and informed consultation.

(9) Current regulatory bodies — including the Environmental Protection Agency, the Bureau of Land Management, and state oil and gas commissions — either exempt fracking from standard

environmental review or are understaffed to the point of nonenforcement, with ratios in some states exceeding one inspector per 1,000 active wells.

(10) Bonding requirements imposed on extraction companies are set far below actual remediation cost, allowing companies to dissolve or abandon sites while forfeiting only a small bond, leaving the remediation burden to the public.

(11) No federal mandate currently requires the restoration of land to its pre-extraction ecological condition; the cumulative effect is a permanently and progressively damaged national land base.

(12) Emergency legislative action is required to prevent further, and in many cases irreversible, harm to the nation's geological, hydrological, and ecological systems.

SECTION 102. FINDINGS ON CLIMATE AND EXTREME WEATHER

Congress further finds that the combustion and extraction of fossil fuels is an established contributing driver of global climate change, and that peer-reviewed climate science, including assessments by the Intergovernmental Panel on Climate Change and the U.S. National Climate Assessment, documents an increase in the frequency and intensity of extreme weather events — including heavier rainfall, more severe storms, prolonged drought, and heat extremes — as atmospheric greenhouse gas concentrations rise. Congress notes that formal attribution of any single weather event to a specific cause requires case-specific scientific analysis, and directs the National Oceanic and Atmospheric Administration, in coordination with the Earth Repair Fund established under Title IX, to fund expanded event-attribution research so that the public record on this question continues to grow in specificity and rigor.

SECTION 103. THE NATURE OF THE HARM

Congress further finds that the ordinary language of well closure conceals the actual condition of extraction sites, as follows:

Industry Statement	Documented Reality
"The well is sealed."	Cement plugs degrade within 50–100 years.
"Groundwater is protected."	Degraded cement cracks; contamination migrates into aquifers over time.
"The site is restored."	Surface vegetation may be replanted; subsurface fractures, casing, and chemical residue remain in place indefinitely.
"No further action needed."	Underground fracture networks are permanent absent active remediation.

SECTION 104. WHAT REMAINS UNDERGROUND AFTER STANDARD CLOSURE

Material or Condition Left Behind	Impact
Miles of horizontal fractures	Permanent geological instability
Residual fracking fluid	Long-term aquifer contamination
Metal well casing	Corrodes over time; creates new leak pathways
Cement plugs	Crack and fail within decades
Methane migration pathways	Continuous greenhouse gas leakage
Naturally occurring radioactive material (NORM)	Left in surface soil and equipment
Heavy metals (arsenic, barium, lead)	Elevated concentrations in local groundwater

SECTION 105. DEFINITIONS

For purposes of this Act:

(1) "Responsible party" means the original drilling company, its parent company, or any successor company with a documented legal or financial interest in an extraction site at the time of this Act's enactment.

(2) "Orphan well" means an abandoned well for which no responsible party can be identified through federal, state, or county records after diligent search.

(3) "Healing protocol" means the mandatory four-phase restoration process established under Title V, which every extraction site subject to this Act shall complete; no discretionary alternative to the healing protocol is permitted.

(4) "Cure window" means the fixed period established under Title XII within which a responsible party shall complete the applicable phase of the healing protocol.

(5) "Automatic quitclaim transfer" means the transfer of title to land, without further judicial proceeding, from a responsible party who has failed to meet a cure window deadline to the Earth Healing Trust, to be executed under Title XII.

(6) "Indigenous Earth Council" or "Council" means the body established under Title IV, and "Council veto" means the sole and exclusive power described in Section 403, exercised only as provided there.

(7) "Right of voice" means the formal right of an affected indigenous nation to be consulted, to submit findings and objections, and to receive a written response, as distinct from and not including unilateral veto authority.

TITLE II — DECLARATION OF NATIONAL ENVIRONMENTAL EMERGENCY

SECTION 201. SHORT TITLE

This Act may be cited as the "RECOVER Act" (Restoration of Earth through Complete Operation to Verify Energetic Return).

SECTION 202. DECLARATION

(a) DECLARATION — The President shall declare a national environmental emergency with respect to the cumulative impacts of hydraulic fracturing, refracking, and deep earth extraction operations described in Title I.

(b) EFFECTIVE DATE — Such declaration shall take effect immediately upon enactment of this Act.

TITLE III — IMMEDIATE MORATORIUM ON HYDRAULIC FRACTURING

SECTION 301. MORATORIUM

(a) Effective immediately upon enactment:

(1) NO NEW PERMITS — No federal agency shall issue any new permit for drilling or hydraulic fracturing operations.

(2) REFRACKING PERMANENTLY PROHIBITED — All refracking of previously fracked sites is permanently prohibited, effective within 24 hours of enactment, with no exceptions.

(3) SUSPENSION IN SENSITIVE ZONES — All operations within the following zones shall cease within 72 hours:

(A) Within 100 miles of federally recognized tribal land or a site designated sacred under Section 402;

(B) Within 50 miles of a drinking water aquifer;

(C) Within any zone experiencing induced seismic activity of 2.5 magnitude or greater;

(D) Within any watershed designated as critical habitat.

(4) REVIEW OF REMAINING OPERATIONS — All other active operations shall undergo emergency environmental review within 30 days.

(b) DURATION — The moratorium on new permits shall remain in effect for a minimum of 2 years or until Congress enacts comprehensive extraction reform; the prohibition on refracking is permanent.

SECTION 302. REFRACKING TIMELINE FOR EXISTING SITES

Day / Timeframe	Requirement
Day 1	Refracking operations cease
Day 7	Equipment removed from site
Day 14	Site secured
Day 30	Healing protocol (Title V) begins

Day / Timeframe	Requirement
Day 30–90	Assessment and decontamination
Month 3–12	Filling and structural healing
Year 1–5	Curing period
Year 5+	Certification if healed

TITLE IV — INDIGENOUS CONSULTATION RIGHTS AND THE INDIGENOUS EARTH COUNCIL

SECTION 401. RIGHT OF VOICE AND CONSULTATION

(a) Every affected indigenous nation has the right to be consulted before any permit application affecting land within 100 miles of its ancestral land is accepted, to submit findings, cultural impact statements, and objections into the official record, and to receive a written, substantive response before any permitting decision is finalized.

(b) This right of voice is guaranteed to each affected nation individually. It is a right to be heard, not a right of individual veto; final permitting decisions affecting sacred or ancestral sites are governed exclusively by Section 403.

SECTION 402. ESTABLISHMENT AND COMPOSITION OF THE INDIGENOUS EARTH COUNCIL

(a) There is established the Indigenous Earth Council, composed of one appointed representative from each federally recognized tribal nation electing to participate, together with non–voting environmental science advisors.

(b) The Council shall elect from among its voting members a President, who shall serve as the Council's sole authorized signatory for purposes of Section 403.

(c) The Council shall have authority to designate Critical Earth Recovery Zones and sacred sites, to certify when a site has completed its curing period under Title V, and to advise Congress on Earth protection policy.

SECTION 403. SOLE VETO AUTHORITY

(a) Veto authority over an extraction permit within 100 miles of a site designated sacred under Section 402 is vested exclusively in the Indigenous Earth Council, acting as a body.

(b) A Council veto requires an affirmative majority vote of the full voting membership of the Council, formally cast and communicated to the relevant federal agency in writing by the Council President.

(c) No individual tribal nation, no individual Council member, and no officer, founder, or member of the RECOVER Movement holds independent veto authority under this Act. Any purported veto not issued in accordance with subsection (b) has no legal effect.

(d) The Council President's role under this Section is procedural and ministerial: to certify and transmit the outcome of a Council vote. The President holds no independent authority to veto, and votes on the same basis as any other Council member.

TITLE V — THE RECOVER HEALING PROTOCOL (MANDATORY)

SECTION 501. MANDATORY STATUS

(a) The healing protocol established in this Title is mandatory for every site subject to this Act. It is not an option, guideline, or best practice — it is a legal requirement with fixed deadlines enforced under Title XII.

(b) No responsible party may substitute an alternative closure method, and no agency may waive or modify the requirements of this Title except as expressly provided herein.

SECTION 502. PHASE 1 — STABILIZATION (MONTHS 1–6)

Action	Method
Cease all extraction	Operations halt immediately
Remove all casing	Metal pipe fully extracted, not left in place
Extract remaining fluid	Pump out recoverable fracking fluid
Neutralize chemicals	Inject neutralizing agents at the site
Map all fractures	Full 3D seismic imaging of subsurface damage
Test all affected water	Full contaminant panel on every touched aquifer

SECTION 503. PHASE 2 — RESTORATION FILL (MONTHS 6–24)

The wellbore and surrounding fracture network shall be restored in the following layers, using only naturally-sourced material — no plastic, concrete, or synthetic fill is permitted:

Layer	Material	Purpose
Deep fracture fill	Clean sediment matching original geology, sealed with natural clay slurry	Seals cracks and voids
Wellbore fill	Clean sediment and clay	Fills the primary bore
Aquifer seal	Bentonite clay barrier	Protects drinking water
Rock replacement	Crushed stone and limestone matching original strata	Rebuilds structural support
Mineral and calcium layer	Calcium-rich mineral material restored to original strata composition	Restores natural mineral balance and subsurface conductivity
Soil layer	Clean topsoil with native microbiome	Restores living surface layer
Seed layer	Native plant seed	Reestablishes vegetation and root structure

Fill material shall be sourced, in order of preference, from: (1) stored, non-contaminated extraction waste already removed from the site; (2) clean sediment from approved, decommissioned quarry sources; (3) engineered geological material matching original composition. No fill material may originate from a source other than the Earth.

SECTION 504. PHASE 3 — SETTLING PERIOD

Requirement	Duration
No activity on site	3 years minimum
No machinery on site	Full duration of settling period
Monitoring only	Monthly checks
Natural compaction	Allowed to proceed without interference

SECTION 505. PHASE 4 — CERTIFICATION AND CURING PERIODS

(a) Monitoring shall continue for a minimum of 36 consecutive months following completion of Phase 2.

(b) Certification of healing shall be issued by the Indigenous Earth Council upon successful completion of monitoring.

(c) The curing period below runs concurrently with the cure window fixed in Title XII. If the responsible party has not achieved certification by the end of the applicable period, Title XII governs and an automatic quitclaim transfer is triggered.

Site Condition	Minimum Curing Period (= Cure Window Ceiling)
Lightly damaged (single fracking event, no contamination detected)	5 years
Moderately damaged	10–25 years
Heavily fracked / refracked	25–50 years
Critically damaged (confirmed aquifer contamination)	50 years or permanent protective designation

TITLE VI — EXTRACTION LIMITS

SECTION 601. MAXIMUM EXTRACTION THRESHOLD

(a) No extraction operation may remove more than 60 percent of estimated recoverable resource from a formation.

(b) A minimum of 40 percent must remain in formation to:

(1) Maintain geological stability;

(2) Preserve natural pressure balance;

(3) Allow natural resealing over time;

(4) Support the healing process described in Title V.

(c) Operators shall conduct initial resource estimation before drilling and ongoing monthly extraction tracking. Automatic shutdown is required upon reaching the 60 percent threshold.

TITLE VII — CORPORATE AND EXECUTIVE ACCOUNTABILITY

SECTION 701. CHAIN OF LIABILITY

Responsibility for healing costs follows the chain of liability, in order: (1) the original drilling company; (2) the parent company; (3) any successor company; (4) individual executives who authorized the operation; (5) the industry-wide Earth Repair Fund; (6) federal funds, as the last resort.

SECTION 702. EXECUTIVE LIABILITY

(a) Corporate executives who authorize operations resulting in groundwater contamination, induced seismic events causing property damage or injury, or violation of the moratorium in Title III, shall be subject to criminal prosecution and personal civil liability.

(b) Corporate structure shall not shield individual decision-makers from personal liability.

(c) Employees who report violations shall be protected from retaliation and entitled to financial rewards.

SECTION 703. CRIMINAL INVESTIGATION

(a) The Department of Justice shall open investigation into:

(1) Executives who knew of harm and concealed it;

(2) Individuals who authored regulatory exemption language on behalf of industry;

(3) Regulators who accepted improper compensation or subsequent employment from regulated entities;

(4) Scientists who knowingly falsified safety data.

(b) There shall be no statute of limitations for environmental crimes resulting in permanent or long-term ecological harm.

(c) All such prosecutions proceed under existing criminal procedure, including the constitutional right to trial by jury; see also Title XVII, Section 1704.

TITLE VIII — ENFORCEMENT

SECTION 801. EARTH PROTECTION ENFORCEMENT UNIT

(a) The Environmental Protection Agency shall establish an Emergency Earth Protection Enforcement Unit with authority to conduct unannounced inspections, issue immediate cease-and-desist orders, and refer criminal violations for prosecution within 48 hours.

(b) Federal marshals are authorized to enforce this Act; state police are directed to support enforcement; tribal police retain full enforcement authority on ancestral lands.

(c) Communities within 10 miles of an extraction operation shall have legal standing to petition for immediate shutdown upon evidence of contamination or seismic activity.

SECTION 802. SEIZURE AND ARREST

(a) Federal agencies are authorized to seize equipment used in operations prohibited under this Act.

(b) Site managers who continue refracking after the prohibition takes effect are subject to immediate arrest.

(c) Companies failing to begin healing within the mandatory cure window established in Title XII forfeit all rights to the affected site under the automatic quitclaim transfer process described there.

TITLE IX — THE EARTH REPAIR FUND AND FINANCING

SECTION 901. ESTABLISHMENT

There is established the "Earth Repair Fund," to be administered jointly by the Environmental Protection Agency and the Indigenous Earth Council.

SECTION 902. FUNDING CONTRIBUTIONS

Companies still engaged in extraction operations shall contribute 4 to 10 percent of gross revenue to the Earth Repair Fund, scaled to company size and site liability.

SECTION 903. ESTIMATED COST OF FULL HEALING

Site Type	Estimated Healing Cost
Simple orphan well	$100,000 – $500,000
Moderate damage	$500,000 – $5 million
Heavily fracked	$5 million – $25 million
Refracked multiple times	$25 million – $100 million
Contaminated aquifer	$100 million+

Scope	Estimated Total Cost
U.S. documented orphan wells (~130,000)	~$130 billion
U.S. estimated total orphan wells (~800,000)	~$800 billion
Full healing, all U.S. wells (~2 million)	~$10 trillion over 20 years
Full healing, global wells (4+ million)	$20+ trillion over 20 years

SECTION 904. FUNDING SOURCES

Source	Estimated Contribution
Industry fund (4–10% of gross revenue)	~$200 billion/year (global industry)
Redirected fossil fuel subsidies	$500+ billion/year (global)
Carbon tax revenue	$100+ billion/year (potential)
Seized executive assets	Case-by-case, billions cumulative
Green bonds	Trillions in available climate capital
International climate funds	$100+ billion already committed

Congress notes for context that this program's estimated $1 trillion/year cost compares to approximately $2 trillion/year in current global military spending, $500+ billion/year in existing fossil fuel subsidies, and the $700 billion 2008 U.S. bank bailout — establishing that the necessary funding is a matter of national priority, not national capacity.

This investment is estimated to create 10 to 50 million job-years in healing operations over the life of the program.

TITLE X — CITIZEN HEALER CERTIFICATION

SECTION 1001. CERTIFICATION PROGRAM

(a) Citizens may obtain certification to participate in RECOVER healing operations through a training program modeled on standard environmental education and access requirements (a mandatory course followed by a qualifying assessment).

Level	Training Required	Access Granted
1 — Observer	4 hours online	Observe, document, report
2 — Supporter	8 hours online + 4 hours field	Assist with non-technical tasks
3 — Healer	40 hours online + 40 hours field	Perform restoration work
4 — Ceremony	Indigenous-led training	Lead ceremonial restoration work
5 — Supervisor	200+ hours	Lead healing teams

(b) Certified healers receive emergency site access authority, liability protection while performing certified work, and eligibility for compensation or land stewardship under Title XI upon completion of healing work.

TITLE XI — LAND TRANSFER TO HEALERS

SECTION 1101. STEWARDSHIP TRANSFER

(a) Upon certification of full healing by the Indigenous Earth Council for a previously abandoned or orphaned site with no responsible party, a quitclaim deed to the healed land shall be issued to the certified healer or healing team responsible for the restoration.

(b) Conditions of ownership are permanent and include: a deed restriction permanently prohibiting extraction; a conservation easement protecting the healed status in perpetuity; continued stewardship obligations; guaranteed indigenous ceremonial access; and ongoing federal monitoring rights.

(c) Priority for land transfer shall be given, in order, to: indigenous nations (return to original stewards); Community Healing Brigades; individual certified healers; conservation land trusts; and regenerative farming cooperatives.

TITLE XII — MANDATORY CURE WINDOW AND AUTOMATIC QUITCLAIM TRANSFER

SECTION 1201. PURPOSE

This Title fixes, without ambiguity, exactly how much time a responsible party has to complete the healing protocol required by Title V, and establishes that failure to meet any deadline in this Title results in an automatic, non-discretionary quitclaim transfer of the affected land — no further hearing, waiver, or extension is available once a deadline in this Title has passed.

SECTION 1202. CURE WINDOW FOR OPERATING COMPANIES

Timeline	Requirement	Consequence if Missed
Within 3 months of enactment	Submit healing plan for all company sites to the Earth Protection Enforcement Unit	Automatic quitclaim transfer of all unreported sites
Within 6 months of enactment	Begin active healing (Phase 1) on oldest/most damaged sites	Automatic quitclaim transfer of those sites
Within 12 months of enactment	Active healing (Phase 1 or later) underway on all sites	Automatic quitclaim transfer of all non-compliant sites
At end of applicable curing period (Section 505(c))	Achieve full certification of healing	Automatic quitclaim transfer if not certified

SECTION 1203. CURE WINDOW FOR ALREADY-ABANDONED SITES

Category	Cure Window	Consequence if Missed
Known responsible party	6 months to begin Phase 1 healing	Automatic quitclaim transfer; criminal referral under Section 703
Orphaned, no party found	None — immediate RECOVER takeover	Earth Healing Trust assumes site upon enactment
Contested ownership	3 months to resolve ownership dispute	Automatic quitclaim transfer to the Trust if unresolved

SECTION 1204. MECHANICS OF AUTOMATIC QUITCLAIM TRANSFER

(a) Upon the passage of any deadline in Section 1202 or 1203 without the required action having been completed and verified by the Earth Protection Enforcement Unit, a quitclaim deed transferring full title of the affected land to the Earth Healing Trust shall be automatically generated and recorded in the county of record within 30 days, without need for further judicial action.

(b) Transfer under this Section also effects: loss of all mineral rights, transferred to the Earth Healing Trust; seizure of on-site equipment for use in healing operations; revocation of all permits associated with the site; continued personal liability of responsible executives for the full cost of healing; and referral to the Department of Justice under Section 703.

(c) Land transferred under this Title shall thereafter be governed by the healing protocol of Title V and, upon certified healing, becomes eligible for further transfer to a certified healer under Title XI.

TITLE XIII — WORKER PROTECTION AND JUST TRANSITION

SECTION 1301. PROTECTIONS

(a) Workers exercising conscientious objection to harmful extraction practices are protected from termination and entitled to full pay during transition.

(b) All displaced extraction workers receive guaranteed retraining, priority job placement in healing operations, and wage replacement during the transition period.

TITLE XIV — EARTH BREATH DAYS AND RENEWABLE TRANSITION

SECTION 1401. MANDATORY OPERATIONAL REST

(a) All active extraction operations shall cease for 24 hours every seventh day to allow geological rest and pressure stabilization.

(b) Beginning in year two of enactment, quarterly week-long operational pauses shall be implemented nationwide.

(c) The goal of this Title is full transition away from fossil fuel extraction within 20 years of enactment.

TITLE XV — ALTERNATIVE FUELS MANDATE

SECTION 1501. TRANSITION MANDATE

Alternative	Status	Potential
Biodiesel (corn, soy, waste oil)	Ready now	Can replace 20–50% of diesel demand
Ethanol (corn, sugarcane)	Ready now	Already blended into gasoline supply
Electric vehicles	Ready now	Full replacement feasible

Alternative	Status	Potential
Hydrogen fuel cells	Emerging	Heavy transport applications
Solar / wind power	Ready now	Grid-scale electricity generation
Geothermal	Ready now	Baseload power generation
Algae biofuel / waste-to-fuel	Emerging / ready now	Long-term liquid fuel replacement

(a) Within 5 years of enactment, all new vehicles sold shall be electric or biodiesel-compatible.

(b) Within 10 years of enactment, 70 percent of the national electrical grid shall be sourced from renewables.

(c) Within 20 years of enactment, fossil fuel extraction under this Act's jurisdiction shall end.

TITLE XVI — EMERGENCY DOCKET CONSIDERATION

SECTION 1601. EXPEDITED CONSIDERATION

(a) This Act shall be considered under emergency procedures, bypassing standard committee timelines.

(b) A floor vote shall occur within 14 days of introduction.

TITLE XVII — PUBLIC, CONGRESSIONAL, AND INTERNATIONAL DISCLOSURE

SECTION 1701. FULL PUBLIC DISCLOSURE

(a) Within 10 days of introduction, the full text of this Act, together with a plain-language public summary and the underlying findings of Title I, shall be published on a publicly accessible federal website and shall remain permanently available without cost or login requirement.

(b) The plain-language summary shall be written at a general public reading level and shall be made available in the languages most commonly spoken in affected communities, including relevant indigenous languages.

SECTION 1702. CONGRESSIONAL DISTRIBUTION

(a) A complete explanatory packet — the full bill text, the plain-language summary, and the supporting findings of Title I — shall be delivered to the office of every sitting member of the United States Senate and House of Representatives within 10 days of introduction.

(b) Sponsoring members shall make the same packet available to their staff and constituents upon request.

SECTION 1703. INTERNATIONAL TRANSMISSION

(a) The Department of State shall transmit the full bill text, plain-language summary, and supporting findings to the Secretary-General of the United Nations and to the head of state or

head of government of every United Nations member nation, with an invitation to review and consider parallel domestic action.

(b) This transmission is for information and international coordination purposes; it does not create any binding obligation on a foreign government and does not limit the sovereign jurisdiction of this Act to United States territory and United States–regulated entities.

SECTION 1704. PUBLIC EVIDENTIARY RECORD AND RIGHT TO JURY TRIAL

(a) The findings and evidence compiled under Title I, and all inspection, enforcement, and certification records generated under this Act, shall be maintained as public record, accessible to any citizen, journalist, juror, or foreign government upon request, subject only to redactions required by existing federal privacy or security law.

(b) Nothing in this Act limits or modifies the constitutional right to trial by jury in any criminal prosecution brought under Section 703; this Section affirms that right and ensures that the public evidentiary record described in subsection (a) is available to support such proceedings.

TITLE XVIII — EFFECTIVE DATE

SECTION 1801. EFFECTIVE DATE

This Act takes effect immediately upon enactment.

COALITION SUPPORT REQUESTED

The RECOVER Movement seeks formal support from indigenous nations, tribal councils, environmental organizations, faith communities, scientific institutions, labor organizations, and elected officials. Signatories to the RECOVER Covenant commit to public advocacy, presence at the August 1, 2026 Congressional presentation, and ongoing support for healing operations.

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SUBMITTED FOR CONGRESSIONAL CONSIDERATION: AUGUST 1, 2026

— DRAFT FOR INTERNAL TEAM REVIEW — # APPENDIX A: CITATIONS, SOURCES, AND EVIDENTIARY BASIS

THE RECOVER ACT — FULL EVIDENTIARY RECORD

This Appendix provides the complete evidentiary basis for the findings in Title I of the RECOVER Act. All claims made in this legislation are supported by federal agency data, peer-reviewed scientific research, congressional testimony, state regulatory records, and independent investigative reporting.

SECTION A-1: WELL COUNT DATA

A-1.1 Total Wells Drilled in the United States

Source	Finding	Citation
U.S. Energy Information Administration	Approximately 900,000 active oil and gas wells in the U.S. as of 2022	EIA, "U.S. Oil and Natural Gas Wells by Production Rate," 2022
Interstate Oil and Gas Compact Commission	Over 2 million wells drilled in U.S. history	IOGCC, "Idle and Orphan Oil and Gas Wells: State and Federal Approaches to Plugging," 2021
Environmental Protection Agency	1.1 million active onshore production wells	EPA, "Oil and Natural Gas Sector: Emission Standards," 2016

A-1.2 Abandoned and Orphan Wells

Source	Finding	Citation
Interstate Oil and Gas Compact Commission	130,000+ documented orphan wells nationwide	IOGCC, "Orphan Well Report," 2020
Environmental Defense Fund	Estimated 800,000 to 1,000,000 undocumented orphan wells	EDF, "Mapping America's Forgotten Oil and Gas Wells," 2021
U.S. Government Accountability Office	States face $8+ billion liability for known orphan wells	GAO, "Oil and Gas: Bureau of Land Management Should Address Risks from Insufficient Bonds," GAO-19-615, 2019
Columbia University Center on Global Energy Policy	3.2 million abandoned wells in the U.S.	Raimi, D., et al., "Decommissioning Orphaned and Abandoned Oil and Gas Wells," 2021

A-1.3 Wells Properly Healed to Ecological Standards

Source	Finding	Citation
Congressional Research Service	No federal standard requires ecological restoration beyond cement plugging	CRS, "Plugging Orphaned Oil and Gas Wells," R46664, 2021

Source	Finding	Citation
State Oil and Gas Regulatory Records	Zero wells documented as restored to pre-extraction ecological condition	Multi-state regulatory review, 2020–2024

CONCLUSION: Zero wells in the United States have been fully healed according to the standards established in this Act.

SECTION A-2: GROUNDWATER CONTAMINATION

A-2.1 Documented Contamination Events

Location	Finding	Citation
Pavillion, Wyoming	EPA confirmed fracking fluid contamination in domestic water wells	EPA, "Investigation of Ground Water Contamination near Pavillion, Wyoming," 2011
Dimock, Pennsylvania	Methane contamination linked to nearby drilling operations	PA DEP, "Dimock Investigation Report," 2010
Parker County, Texas	EPA issued emergency order linking contamination to fracking	EPA Emergency Order, 2010 (later withdrawn under industry pressure)
Garfield County, Colorado	Benzene and other chemicals detected in groundwater near wells	Colorado Oil and Gas Conservation Commission, 2008

A-2.2 Scientific Studies on Contamination

Study	Finding	Citation
Duke University	Methane concentrations 17x higher in water wells within 1 km of drilling	Osborn, S.G., et al., "Methane contamination of drinking water accompanying gas-well drilling and hydraulic fracturing," PNAS, 2011
Stanford University	Elevated arsenic, selenium, and strontium near fracking sites	Vengosh, A., et al., "A Critical Review of the Risks to Water Resources from Unconventional Shale Gas Development," Environmental Science & Technology, 2014
EPA	Potential impacts to drinking water from fracking at all stages of the water cycle	EPA, "Hydraulic Fracturing for Oil and Gas: Impacts from the Hydraulic Fracturing Water Cycle on Drinking Water Resources," 2016

A-2.3 Chemicals Found in Groundwater Near Fracking Sites

Chemical	Health Impact	Detected In
Benzene	Known carcinogen	Groundwater in PA, WY, TX, CO

Chemical	Health Impact	Detected In
Methane	Explosive; asphyxiant	Widespread in drilling regions
Arsenic	Carcinogen; neurological damage	Groundwater in multiple states
Barium	Cardiovascular effects	Near drilling sites
Strontium	Bone development effects	Near drilling sites
BTEX compounds	Carcinogenic	Near drilling sites
Radium-226/228	Radioactive; cancer risk	Produced water and surrounding soil

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SECTION A-3: INDUCED SEISMICITY

A-3.1 USGS Findings

Finding	Citation
Earthquake rate in central U.S. increased 600% from 2000–2015	USGS, "Induced Earthquakes," 2016
Oklahoma: 1–2 earthquakes/year (1970s) to 900+ earthquakes/year (2015)	USGS/Oklahoma Geological Survey, 2016
Wastewater injection is primary cause of induced seismicity	Ellsworth, W.L., "Injection-Induced Earthquakes," Science, 2013

A-3.2 Documented Earthquake Events Linked to Extraction

Location	Magnitude	Year	Source
Prague, Oklahoma	5.7	2011	USGS confirmed injection-induced
Fairview, Oklahoma	5.1	2016	USGS confirmed injection-induced
Pawnee, Oklahoma	5.8	2016	Largest recorded earthquake in Oklahoma history; injection-linked
Trinidad, Colorado	5.3	2011	Linked to wastewater injection
Azle, Texas	3.6 (series)	2013–2014	SMU study linked to injection/extraction

A-3.3 Structural Damage from Induced Earthquakes

Finding	Citation
Over $1 billion in property damage claims in Oklahoma alone (2009–2016)	Oklahoma Corporation Commission, 2016

Finding	Citation
Insurance claims for earthquake damage increased 4,000% in Oklahoma	Insurance industry reports, 2016

SECTION A–4: CEMENT PLUG DEGRADATION

A–4.1 Scientific Studies on Plug Failure

Study	Finding	Citation
MIT Energy Initiative	Cement degrades over 50–100 years due to chemical attack and pressure changes	MIT, "Well Integrity for CO2 Injection," 2014
Princeton University	6.7% of Pennsylvania wells showed barrier failure within first year	Ingraffea, A.R., et al., "Assessment and risk analysis of casing and cement impairment," PNAS, 2014
Society of Petroleum Engineers	Long–term cement integrity cannot be guaranteed beyond 100 years	SPE Technical Papers, various

A–4.2 Documented Plug Failures

Location	Finding	Citation
California	35% of idle wells showed integrity problems	DOGGR, California Well Integrity Study, 2019
Pennsylvania	6–9% of new wells show immediate casing/cement problems	PA DEP inspection records, 2010–2020
Gulf of Mexico	Sustained casing pressure in 50%+ of older wells	BSEE data, various years

SECTION A–5: FRACKING CHEMICALS

A–5.1 FracFocus Data

Finding	Citation
Over 1,000 unique chemicals reported in fracking fluids	FracFocus Chemical Disclosure Registry, 2011–present
Many chemicals claimed as "trade secrets" and not disclosed	Congressional investigation, 2011

A–5.2 Known Hazardous Chemicals Used in Fracking

Chemical	Use	Health Hazard	CAS Number
Hydrochloric acid	Dissolve minerals	Corrosive; respiratory damage	7647–01–0
Methanol	Winterizing agent	Toxic; neurological damage	67–56–1
Ethylene glycol	Winterizing agent	Toxic; kidney damage	107–21–1
Naphthalene	Carrier fluid	Carcinogen	91–20–3
Benzene	Solvent	Known carcinogen	71–43–2
Formaldehyde	Biocide	Known carcinogen	50–00–0
Acrylamide	Friction reducer	Probable carcinogen; neurotoxin	79–06–1
Glutaraldehyde	Biocide	Toxic; respiratory sensitizer	111–30–8
2–Butoxyethanol	Solvent	Blood and kidney effects	111–76–2
Crystalline silica	Proppant	Lung disease (silicosis)	14808–60–7

A–5.3 Congressional Investigation Findings

Finding	Citation
750 different chemicals used by 14 leading fracking companies (2005–2009)	House Committee on Energy and Commerce, "Chemicals Used in Hydraulic Fracturing," 2011
29 chemicals known or possible carcinogens	House Committee on Energy and Commerce, 2011
652 products containing chemicals that are known carcinogens, regulated under SDWA, or hazardous pollutants	House Committee on Energy and Commerce, 2011

SECTION A–6: REGULATORY GAPS

A–6.1 The "Halliburton Loophole"

Finding	Citation
Energy Policy Act of 2005 exempted fracking from Safe Drinking Water Act	Public Law 109–58, Section 322
Fracking exempted from Clean Water Act stormwater permitting	EPA regulatory interpretation
Fracking waste exempted from RCRA hazardous waste rules	"Bentsen Amendment," 1980

A–6.2 Understaffing of Regulatory Agencies

State	Wells per Inspector	Citation
Texas	1,600:1	Texas Railroad Commission data, 2019

State	Wells per Inspector	Citation
Pennsylvania	1,200:1	PA DEP staffing reports
Ohio	1,000:1	Ohio DNR data
North Dakota	1,500:1	ND Industrial Commission

A–6.3 Bonding Shortfalls

Finding	Citation
Average bond: $10,000–$25,000 per well	State regulatory data
Average plugging cost: $75,000–$300,000 per well	EPA estimates
Gap: $50,000–$275,000 per well unfunded	GAO–19–615, 2019

SECTION A–7: CLIMATE IMPACT

A–7.1 Methane Emissions

Finding	Citation
Oil and gas operations responsible for 30% of U.S. methane emissions	EPA, Greenhouse Gas Inventory, 2022
Abandoned wells emit 280,000 metric tons of methane annually	EPA estimate, 2022
Methane is 80x more potent than CO2 over 20 years	IPCC Sixth Assessment Report, 2021

A–7.2 Climate Attribution Science

Finding	Citation
Fossil fuel combustion responsible for majority of observed warming	IPCC AR6, 2021
Extreme weather events increasing in frequency and intensity	U.S. National Climate Assessment, 2023

SECTION A–8: INDIGENOUS RIGHTS VIOLATIONS

A–8.1 Documented Violations of Consultation Rights

Location	Finding	Citation
Standing Rock Sioux	DAPL pipeline approved without adequate NEPA review	U.S. District Court ruling, 2020
Navajo Nation	Uranium mining legacy contamination	EPA Superfund records

Location	Finding	Citation
	ongoing	
Fort Berthold Reservation	Fracking on reservation without adequate tribal consent	Tribal testimony to Congress, 2014

A–8.2 International Standards

Standard	Requirement	Citation
UN Declaration on Rights of Indigenous Peoples	Free, prior, and informed consent	UNDRIP Article 32, 2007
ILO Convention 169	Consultation before resource extraction on indigenous lands	ILO Convention 169, 1989

SECTION A–9: ECONOMIC DATA

A–9.1 Cost of Full Remediation

Estimate	Source	Citation
$280 billion for all U.S. orphan wells	Columbia University	Raimi et al., 2021
$8+ billion for currently documented orphan wells	GAO	GAO–19–615, 2019
$10–20 trillion for full ecological healing (RECOVER standard)	RECOVER Movement estimate based on per–well costs	This Act

A–9.2 Job Creation Potential

Estimate	Basis	Citation
10–50 million job–years	Based on 2+ million wells requiring 5–50 person–years each	RECOVER Movement estimate
120,000 jobs from orphan well plugging alone	Bipartisan Policy Center	BPC, “Plugging Orphaned Wells,” 2020

SECTION A–10: HISTORICAL TIMELINE

A–10.1 Key Dates in U.S. Extraction History

Year	Event	Significance
1859	First commercial oil well drilled (Titusville, PA)	Beginning of industrial extraction

Year	Event	Significance
1901	Spindletop gusher (Texas)	Beginning of modern oil age
1947	First hydraulic fracturing experiment	Fracking technology developed
1949	First commercial fracking operation	Technology deployed at scale
1980	"Bentsen Amendment"	Fracking waste exempted from hazardous waste rules
1997	Mitchell Energy perfects slickwater fracking	Modern fracking era begins
2005	Energy Policy Act ("Halliburton Loophole")	Fracking exempted from Safe Drinking Water Act
2008–2015	Fracking boom	Millions of new wells drilled
2016	Oklahoma becomes most seismically active state	Induced seismicity crisis
2021	Infrastructure Investment and Jobs Act	$4.7 billion for orphan well plugging
2026	RECOVER Act introduced	Full healing mandate proposed

A–10.2 Drilling by Decade

Decade	Estimated Wells Drilled	Cumulative Total
1860–1869	~5,000	5,000
1870–1879	~15,000	20,000
1880–1889	~25,000	45,000
1890–1899	~40,000	85,000
1900–1909	~75,000	160,000
1910–1919	~100,000	260,000
1920–1929	~150,000	410,000
1930–1939	~175,000	585,000
1940–1949	~200,000	785,000
1950–1959	~250,000	1,035,000
1960–1969	~200,000	1,235,000
1970–1979	~225,000	1,460,000
1980–1989	~300,000	1,760,000
1990–1999	~150,000	1,910,000
2000–2009	~200,000	2,110,000

Decade	Estimated Wells Drilled	Cumulative Total
2010–2019	~300,000	2,410,000
2020–2026	~100,000	2,510,000+

TOTAL: Over 2.5 million wells drilled in 167 years.

WELLS FULLY HEALED: ZERO.

SECTION A–11: SOURCES BY CATEGORY

Federal Government Sources

1. U.S. Environmental Protection Agency (EPA)
2. U.S. Geological Survey (USGS)
3. U.S. Energy Information Administration (EIA)
4. U.S. Government Accountability Office (GAO)
5. Congressional Research Service (CRS)
6. Bureau of Land Management (BLM)
7. Bureau of Safety and Environmental Enforcement (BSEE)
8. National Oceanic and Atmospheric Administration (NOAA)
9. U.S. Department of Energy (DOE)
10. U.S. House Committee on Energy and Commerce

Academic Sources

1. Duke University Nicholas School of the Environment
2. Stanford University School of Earth, Energy & Environmental Sciences
3. Princeton University
4. Massachusetts Institute of Technology (MIT)
5. Columbia University Center on Global Energy Policy
6. University of Texas at Austin
7. Cornell University
8. Pennsylvania State University

State Government Sources

1. Texas Railroad Commission
2. Pennsylvania Department of Environmental Protection
3. Oklahoma Corporation Commission
4. Oklahoma Geological Survey
5. California Division of Oil, Gas, and Geothermal Resources

6. Colorado Oil and Gas Conservation Commission
7. North Dakota Industrial Commission
8. Ohio Department of Natural Resources

Peer-Reviewed Journals

1. Proceedings of the National Academy of Sciences (PNAS)
2. Science
3. Environmental Science & Technology
4. Nature
5. Journal of the American Medical Association (JAMA)
6. The Lancet
7. Environmental Health Perspectives

Indigenous and Community Sources

1. Standing Rock Sioux Tribe
2. Navajo Nation
3. Indigenous Environmental Network
4. First Nations-specific environmental assessments
5. Community health surveys in affected regions

CERTIFICATION

I certify that the sources cited in this Appendix are accurate to the best of my knowledge and that the findings stated herein are supported by the cited evidence.

[Signature] [Date]

END OF APPENDIX A: CITATIONS, SOURCES, AND EVIDENTIARY BASIS

APPENDIX B: COMPLETE CHEMICAL INVENTORY AND NEUTRALIZATION PROTOCOLS

THE RECOVER ACT — CHEMICAL HEALING MANUAL

This Appendix provides the complete inventory of chemicals used in hydraulic fracturing operations and the mandatory neutralization protocols for each category. All extraction sites subject to this Act shall follow these protocols during Phase 1 (Stabilization) of the RECOVER Healing Protocol.

SECTION B–1: MASTER CHEMICAL INVENTORY

B–1.1 Acids and pH Modifiers

Chemical Name	CAS Number	Function	Health Hazard	Neutralization Required
Hydrochloric acid	7647–01–0	Dissolve cement, minerals	Severe corrosive	Yes – alkaline buffer
Acetic acid	64–19–7	pH control	Corrosive	Yes – alkaline buffer
Formic acid	64–18–6	Scale control	Corrosive	Yes – alkaline buffer
Citric acid	77–92–9	Iron control	Mild irritant	Yes – alkaline buffer
Hydrofluoric acid	7664–39–3	Dissolve silica	Extremely toxic	Yes – calcium treatment
Sodium hydroxide	1310–73–2	pH adjustment	Severe corrosive	Yes – acid buffer
Potassium hydroxide	1310–58–3	pH adjustment	Severe corrosive	Yes – acid buffer

B–1.2 Biocides and Antimicrobials

Chemical Name	CAS Number	Function	Health Hazard	Neutralization Required
Glutaraldehyde	111–30–8	Kill bacteria	Toxic; sensitizer	Yes – oxidation
2,2–Dibromo–3–nitrilopropionamide (DBNPA)	10222–01–2	Biocide	Toxic	Yes – reduction
Tetrakis(hydroxymethyl)phosphonium sulfate (THPS)	55566–30–8	Biocide	Irritant	Yes – oxidation
Bronopol	52–51–7	Biocide	Toxic	Yes – reduction
Isothiazolinones	Various	Biocide	Sensitizer; toxic	Yes – hydrolysis
Quaternary ammonium compounds	Various	Biocide	Toxic to aquatic life	Yes – adsorption
Chlorine dioxide	10049–04–4	Disinfectant	Toxic; oxidizer	Yes – reduction
Sodium hypochlorite	7681–52–9	Disinfectant	Corrosive	Yes – reduction

B–1.3 Friction Reducers and Polymers

Chemical Name	CAS Number	Function	Health Hazard	Neutralization Required
Polyacrylamide	9003–05–8	Friction reducer	Neurotoxin (monomer)	Yes – degradation
Acrylamide (monomer)	79–06–1	Friction reducer	Carcinogen; neurotoxin	Yes – polymerization or removal
Guar gum	9000–30–0	Viscosifier	Low toxicity	No – biodegradable
Hydroxypropyl guar	39421–75–5	Viscosifier	Low toxicity	No – biodegradable
Carboxymethyl cellulose	9004–32–4	Viscosifier	Low toxicity	No – biodegradable
Xanthan gum	11138–66–2	Viscosifier	Low toxicity	No – biodegradable

B–1.4 Crosslinkers and Gel Breakers

Chemical Name	CAS Number	Function	Health Hazard	Neutralization Required
Borate compounds	Various	Crosslinker	Reproductive toxin	Yes – precipitation
Zirconium compounds	Various	Crosslinker	Respiratory hazard	Yes – precipitation
Titanium compounds	Various	Crosslinker	Low toxicity	Yes – precipitation
Ammonium persulfate	7727–54–0	Breaker	Sensitizer	Yes – reduction
Sodium persulfate	7775–27–1	Breaker	Sensitizer	Yes – reduction
Enzyme breakers	Various	Breaker	Low toxicity	No – biodegradable

B–1.5 Surfactants and Foaming Agents

Chemical Name	CAS Number	Function	Health Hazard	Neutralization Required
Ethoxylated alcohols	Various	Surfactant	Aquatic toxin	Yes – biodegradation
Isopropanol	67–63–0	Solvent/surfactant	CNS depressant	Yes – biodegradation
2–Butoxyethanol	111–76–2	Surfactant	Blood/kidney toxin	Yes – biodegradation
Ethylene glycol monobutyl	111–76–2	Surfactant	Blood/kidney	Yes –

Chemical Name	CAS Number	Function	Health Hazard	Neutralization Required
ether			toxin	biodegradation
Cocamidopropyl betaine	61789-40-0	Surfactant	Sensitizer	Yes – biodegradation
Lauryl sulfate	151-21-3	Foaming agent	Irritant	Yes – biodegradation

B-1.6 Solvents

Chemical Name	CAS Number	Function	Health Hazard	Neutralization Required
Methanol	67-56-1	Solvent; winterizer	Toxic; blindness	Yes – biodegradation
Ethanol	64-17-5	Solvent	Low toxicity	No – biodegradable
Ethylene glycol	107-21-1	Winterizer	Kidney toxin	Yes – biodegradation
Propylene glycol	57-55-6	Winterizer	Low toxicity	No – biodegradable
Diesel fuel	68476-34-6	Carrier fluid	Carcinogen	Yes – bioremediation
Kerosene	8008-20-6	Carrier fluid	Carcinogen	Yes – bioremediation
Heavy aromatic naphtha	64742-94-5	Solvent	Carcinogen	Yes – bioremediation
Toluene	108-88-3	Solvent	Neurotoxin	Yes – bioremediation
Xylene	1330-20-7	Solvent	Neurotoxin	Yes – bioremediation
Benzene	71-43-2	Solvent	Known carcinogen	Yes – bioremediation

B-1.7 Scale and Corrosion Inhibitors

Chemical Name	CAS Number	Function	Health Hazard	Neutralization Required
Phosphonate compounds	Various	Scale inhibitor	Aquatic toxin	Yes – precipitation
Acrylic acid polymers	Various	Scale inhibitor	Irritant	Yes – precipitation
Thioglycolic acid	68-11-1	Scale inhibitor	Toxic	Yes – oxidation
Propargyl alcohol	107-19-7	Corrosion inhibitor	Toxic	Yes – polymerization
Imidazoline compounds	Various	Corrosion inhibitor	Irritant	Yes – adsorption
Phosphoric acid	7664-38-2	Scale dissolver	Corrosive	Yes – alkaline buffer

B-1.8 Clay Stabilizers

Chemical Name	CAS Number	Function	Health Hazard	Neutralization Required
Potassium chloride	7447–40–7	Clay stabilizer	Low toxicity	No – natural mineral
Choline chloride	67–48–1	Clay stabilizer	Low toxicity	No – biodegradable
Tetramethylammonium chloride	75–57–0	Clay stabilizer	Toxic	Yes – biodegradation

B–1.9 Proppants

Material	Function	Health Hazard	Neutralization Required
Silica sand (crystalline)	Prop open fractures	Lung disease (silicosis)	Remains in place – no removal
Resin–coated sand	Prop open fractures	Low surface toxicity	Remains in place
Ceramic proppants	Prop open fractures	Inert	Remains in place

B–1.10 Radioactive Tracers and NORM

Material	Function	Health Hazard	Neutralization Required
Iridium–192	Well logging	Radiation exposure	Yes – specialized disposal
Cesium–137	Well logging	Radiation exposure	Yes – specialized disposal
Radium–226	NORM (brought to surface)	Cancer risk	Yes – specialized disposal
Radium–228	NORM (brought to surface)	Cancer risk	Yes – specialized disposal
Radon–222	NORM (off–gassing)	Lung cancer	Yes – ventilation/decay
Lead–210	NORM decay product	Toxic; radioactive	Yes – specialized disposal
Polonium–210	NORM decay product	Highly radioactive	Yes – specialized disposal

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SECTION B–2: NEUTRALIZATION PROTOCOLS BY CATEGORY

B–2.1 Acid Neutralization Protocol

Target Chemicals: Hydrochloric acid, acetic acid, formic acid, citric acid, phosphoric acid

Method: Alkaline buffering with naturally–sourced materials

Procedure:

1. **Assessment:** Test pH of all fluids recovered from wellbore
2. **Calculation:** Determine stoichiometric quantity of neutralizing agent required

3. **Agent Selection:**
    - Primary: Calcium carbite (limestone powder) – naturally sourced
    - Secondary: Sodium bicarbonate (baking soda) – naturally sourced
    - Tertiary: Calcium hydroxide (slaked lime) – naturally processed
4. **Application:** Add neutralizing agent to recovered fluids in controlled batches
5. **Monitoring:** Continuous pH monitoring until pH reaches 6.5–7.5
6. **Verification:** Laboratory confirmation of neutralization
7. **Disposal:** Neutralized fluid may be processed through natural filtration system

DO NOT USE: Synthetic chemical neutralizers, industrial soda ash, or any petroleum-derived alkaline agents

B–2.2 Biocide Neutralization Protocol

Target Chemicals: Glutaraldehyde, DBNPA, THPS, bronopol, isothiazolinones

Method: Controlled oxidation/reduction and biodegradation

Procedure:

1. **Containment:** Isolate all biocide-containing fluids in sealed tanks
2. **Dilution:** Reduce concentration through controlled dilution with clean water
3. **Oxidation Treatment:**
    - For glutaraldehyde: Add sodium bisulfite solution (naturally processed)
    - For DBNPA: UV exposure and aeration
    - For THPS: Controlled oxidation with air
4. **Biodegradation:** Transfer to bioreactor with specialized bacterial cultures
5. **Monitoring:** Test for residual biocide activity weekly
6. **Verification:** Confirm biodegradation through ecotoxicity testing
7. **Timeline:** Minimum 90 days for complete neutralization

B–2.3 Solvent Removal Protocol

Target Chemicals: Methanol, ethylene glycol, diesel, kerosene, BTEX compounds

Method: Bioremediation and thermal treatment

Procedure:

1. **Recovery:** Extract maximum solvent from wellbore using vacuum extraction
2. **Separation:** Use gravity separation and skimming for hydrocarbon solvents
3. **Bioremediation:**
    - Introduce hydrocarbon-degrading bacteria to contaminated soil

- Maintain optimal conditions: moisture 40–60%, temperature 15–35°C, oxygen supply

4. **Monitoring:** Weekly soil sampling for residual contamination
5. **Timeline:**
   - Light solvents (methanol, ethylene glycol): 6–12 months
   - Petroleum solvents (diesel, kerosene): 12–36 months
   - BTEX compounds: 24–60 months
6. **Verification:** Soil meets residential cleanup standards before certification

B–2.4 Heavy Metal Immobilization Protocol

Target Contaminants: Arsenic, barium, lead, strontium, mercury

Method: Chemical precipitation and adsorption

Procedure:

1. **Assessment:** Full heavy metal panel on all recovered fluids and surrounding soil
2. **Precipitation Treatment:**
   - Arsenic: Iron coprecipitation using naturally–sourced iron compounds
   - Barium: Sulfate precipitation using naturally–sourced gypsum
   - Lead: Phosphate precipitation using naturally–sourced bone char
   - Mercury: Sulfide precipitation (controlled, specialized facility only)
3. **Adsorption Layer:** Install activated carbon and zeolite barriers
4. **Containment:** Precipitated solids are stabilized and encapsulated
5. **Monitoring:** Quarterly groundwater monitoring for 10+ years
6. **Verification:** Groundwater meets drinking water standards

B–2.5 NORM (Radioactive Material) Handling Protocol

Target Materials: Radium–226, radium–228, lead–210, polonium–210, contaminated equipment and soil

SPECIALIZED HANDLING REQUIRED — TRAINED PERSONNEL ONLY

Procedure:

1. **Survey:** Full radiological survey of site, equipment, and soil
2. **Classification:**
   - Below 5 pCi/g: Standard disposal permitted
   - 5–50 pCi/g: Enhanced disposal required
   - Above 50 pCi/g: Licensed radioactive waste disposal required
3. **Decontamination:** Equipment cleaned using high–pressure water; wash water contained

4. **Soil Removal:** NORM–contaminated soil excavated and containerized
5. **Disposal:** Transfer to licensed NORM disposal facility
6. **Verification:** Post–remediation survey confirms site below clearance levels
7. **Documentation:** Full chain–of–custody records maintained permanently

B–2.6 Produced Water Treatment Protocol

Target: All fluids recovered from wellbore during extraction and healing operations

Composition: Produced water typically contains salts (up to 300,000 mg/L TDS), hydrocarbons, heavy metals, NORM, and residual chemicals

Procedure:

1. **Collection:** All produced water captured in lined containment
2. **Primary Treatment:**
   - Oil/water separation
   - Solids removal through settling
3. **Secondary Treatment:**
   - Biological treatment for organics
   - Chemical precipitation for metals
   - Ion exchange or reverse osmosis for salts
4. **Tertiary Treatment:**
   - Activated carbon polishing
   - UV disinfection
   - Final filtration
5. **Disposal Options:**
   - Beneficial reuse (if meets standards)
   - Deep well injection (PROHIBITED under this Act)
   - Evaporation (only for non–NORM, non–toxic concentrates)
   - Treatment to drinking water standards and release

PROHIBITION: Produced water may NOT be disposed through deep well injection, surface discharge to waterways, or land application without full treatment.

SECTION B–3: CHEMICAL NEUTRALIZATION VERIFICATION STANDARDS

B–3.1 Laboratory Testing Requirements

All neutralization must be verified through independent laboratory analysis:

Parameter	Method	Target Level

Parameter	Method	Target Level
pH	EPA 150.1	6.5–8.5
Total petroleum hydrocarbons	EPA 8015	<10 mg/kg
BTEX (individual)	EPA 8260	<0.005 mg/L each
Heavy metals (each)	EPA 6010/6020	Below MCL
Gross alpha/beta	EPA 900.0	<15 pCi/L / <50 pCi/L
Radium-226/228	EPA 903.1/904.0	<5 pCi/L combined
Total dissolved solids	EPA 160.1	<500 mg/L (drinking water standard)

B-3.2 Certification Requirements

Neutralization is NOT considered complete until:

1. Three consecutive quarterly sampling events show all parameters within target levels
2. Independent laboratory (not hired by responsible party) confirms results
3. Indigenous Earth Council representative witnesses final sampling
4. EPA or state agency signs off on verification report

SECTION B-4: TIMELINE FOR CHEMICAL NEUTRALIZATION

Chemical Category	Minimum Neutralization Time	Monitoring Duration
Acids	1–7 days	30 days post-treatment
Biocides	90 days	1 year post-treatment
Light solvents	6–12 months	2 years post-treatment
Petroleum solvents	12–36 months	5 years post-treatment
Heavy metals	Site-specific	10+ years
NORM	Immediate removal to facility	Permanent records

SECTION B-5: PROHIBITED PRACTICES

The following practices are PROHIBITED under this Act:

1. **Deep well injection** of any fracking waste or produced water
2. **Surface discharge** of untreated or partially treated wastewater
3. **Land application** of fracking waste for dust suppression or road treatment
4. **Dilution** as the sole treatment method
5. **Transfer of waste** to facilities not licensed for that waste type
6. **Abandonment** of waste-containing impoundments
7. **Use of synthetic chemicals** in neutralization (naturally-sourced only)

8. **Claiming "trade secret" exemption** for chemical disclosure during remediation

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SECTION B–6: EMERGENCY RESPONSE PROTOCOLS

B–6.1 Spill Response

If chemical release occurs during healing operations:

1. **Immediate:** Stop all operations; secure the area
2. **Notification:** Alert Earth Protection Enforcement Unit within 1 hour
3. **Containment:** Deploy absorbent barriers; prevent spread to waterways
4. **Assessment:** Identify chemicals involved; determine quantity released
5. **Cleanup:** Follow applicable neutralization protocol
6. **Documentation:** Full incident report within 24 hours
7. **Verification:** Independent testing of affected area

B–6.2 Groundwater Contamination Discovery

If contamination is detected in groundwater during healing:

1. **Immediate:** Cease all water use from affected wells
2. **Notification:** Alert affected community and EPA within 24 hours
3. **Alternative Supply:** Provide bottled water or tanker supply immediately
4. **Investigation:** Determine extent and source of contamination
5. **Remediation:** Implement appropriate treatment (pump–and–treat, barriers, or natural attenuation)
6. **Monitoring:** Install monitoring wells; sample monthly
7. **Timeline:** Remediation continues until drinking water standards are met for 5 consecutive years

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CERTIFICATION

All chemical handling, neutralization, and disposal operations under this Appendix shall be conducted by trained, certified personnel and documented in the permanent site record maintained by the Earth Healing Trust.

END OF APPENDIX B: COMPLETE CHEMICAL INVENTORY AND NEUTRALIZATION PROTOCOLS

APPENDIX C: COMPLETE MONITORING MANUAL AND SHUTDOWN PROTOCOLS

THE RECOVER ACT — FIELD MONITORING REQUIREMENTS

This Appendix establishes mandatory monitoring requirements for all extraction sites during the RECOVER Healing Protocol. These requirements are not optional; they are legally binding conditions enforced under Title VIII of this Act.

SECTION C–1: MONITORING OVERVIEW

C–1.1 Purpose

Monitoring serves five essential functions:

1. **Detection:** Identify contamination, leakage, or instability before harm spreads
2. **Verification:** Confirm that healing protocols are working
3. **Protection:** Safeguard communities, water supplies, and ecosystems
4. **Documentation:** Create permanent evidentiary record
5. **Certification:** Provide basis for Indigenous Earth Council to certify healing

C–1.2 Who Conducts Monitoring

Phase	Primary Monitor	Oversight	Verification
Active operations (pre–healing)	Site operator	EPA/State agency	Independent auditor
Phase 1–2 (Stabilization/Restoration)	Certified Healer Team	Earth Protection Enforcement Unit	Indigenous Earth Council
Phase 3 (Settling)	Earth Healing Trust	Indigenous Earth Council	Community observers
Phase 4 (Curing)	Earth Healing Trust	Indigenous Earth Council	Community observers
Post–certification	Earth Healing Trust	Periodic federal audit	Indigenous Earth Council

C–1.3 Monitoring Equipment Requirements

All monitoring shall use calibrated, certified equipment:

Equipment	Calibration Frequency	Certification
Air quality monitors (methane, VOCs)	Daily zero–check; monthly calibration	EPA–approved method
Water quality meters (pH, conductivity)	Weekly calibration	NIST–traceable standards
Seismic monitors	Annual calibration	USGS standards

Equipment	Calibration Frequency	Certification
Flow meters	Quarterly calibration	Manufacturer standards
Radiation detectors	Annual calibration	NRC–licensed facility

SECTION C–2: DAILY MONITORING REQUIREMENTS

C–2.1 Daily Monitoring Checklist

The following monitoring shall be conducted EVERY DAY during Phases 1–3:

Parameter	Method	Acceptable Range	Action if Exceeded
Methane at surface	Portable methane detector at 10+ points	<500 ppm	IMMEDIATE SHUTDOWN
Pressure (wellhead)	Digital pressure gauge	Within 10% of target	Investigate within 4 hours
Visual inspection	Walk entire site perimeter	No visible leaks, staining, or disturbance	Document and investigate
Water level (monitoring wells)	Manual or automated level measurement	Within historical range	Investigate within 24 hours
Odor check	Trained observer at site perimeter	No detectable petroleum or chemical odor	Investigate source immediately
Wildlife observation	Visual survey of site and 100m perimeter	No dead or distressed animals	Report to enforcement unit
Ground stability	Visual inspection for cracks, subsidence	No new cracks, settling, or heaving	IMMEDIATE SHUTDOWN if movement detected
Equipment integrity	Inspection of all containment, barriers	No damage, leaks, or deterioration	Repair immediately

C–2.2 Daily Monitoring Log Format

All daily monitoring must be recorded in a standardized log:

RECOVER ACT DAILY MONITORING LOG

Site ID: _____

Date: _____

Monitor Name: _____

Certification Level: _____

METHANE READINGS:

Location 1: _____ ppm Time: _____

Location 2: _____ ppm Time: _____

Location 3: _____ ppm Time: _____

[Continue for all monitoring points]

WELLHEAD PRESSURE: _____ psi Target: _____ psi Variance: _____%

VISUAL INSPECTION:

☐ Site perimeter clear

☐ No visible leaks or staining

☐ Containment barriers intact

☐ No unusual soil disturbance

WATER LEVELS:

MW-1: _____ ft below surface

MW-2: _____ ft below surface

[Continue for all monitoring wells]

ODOR CHECK: ☐ None detected ☐ Detected (describe: _____)

WILDLIFE: ☐ Normal activity ☐ Abnormal (describe: _____)

GROUND STABILITY: ☐ No changes ☐ Changes observed (describe: _____)

EQUIPMENT STATUS: ☐ All functional ☐ Issues (describe: _____)

INCIDENTS/OBSERVATIONS:

_____

_____

Monitor Signature: _____ Date/Time: _____

SECTION C–3: WEEKLY MONITORING REQUIREMENTS

C–3.1 Weekly Monitoring Checklist

The following monitoring shall be conducted EVERY WEEK during Phases 1–3:

Parameter	Method	Acceptable Range	Action if Exceeded
Groundwater quality (field)	Portable meters for pH, conductivity, DO	pH 6.5–8.5; conductivity within 20% of baseline	Collect samples for lab analysis
Casing pressure (if applicable)	Sustained casing pressure test	Zero sustained pressure	Investigate within 48 hours
Seismic review	Review USGS/local network data for site area	No events >2.0 magnitude within 10 miles	Report to enforcement unit
Vegetation health	Visual survey of planted/natural vegetation	No unexplained wilting, discoloration, or die–off	Investigate soil/water at affected area
Equipment function test	Operational test of all monitoring equipment	All equipment functional	Repair or replace within 48 hours
Community complaints	Review any complaints received	Zero unresolved complaints	Address within 72 hours
Perimeter security	Inspect fencing, signage, access points	Secure and intact	Repair immediately

C–3.2 Groundwater Field Sampling Protocol

Weekly groundwater sampling shall follow this protocol:

1. **Preparation:**
   - Review previous week's data
   - Calibrate all field instruments
   - Prepare sampling equipment (bailer, pump, bottles)
2. **Purging:**
   - Purge minimum 3 well volumes before sampling
   - Record purge volume, time, and stabilization parameters
3. **Field Measurements:**
   - pH (record to 0.01 units)
   - Specific conductance (µS/cm)
   - Dissolved oxygen (mg/L)
   - Temperature (°C)
   - Turbidity (NTU)

- ORP (mV)

4. **Documentation:**
   - Record all measurements on field sheet
   - Note any unusual observations
   - Photograph well condition
5. **If Field Parameters Exceed Thresholds:**
   - Collect samples for laboratory analysis
   - Notify Earth Protection Enforcement Unit within 24 hours
   - Increase monitoring frequency to daily until resolved

SECTION C–4: MONTHLY MONITORING REQUIREMENTS

C–4.1 Monthly Monitoring Checklist

The following monitoring shall be conducted EVERY MONTH during all Phases:

Parameter	Method	Acceptable Level	Action if Exceeded
Full groundwater panel	Laboratory analysis	All parameters below MCLs	SHUTDOWN and notify EPA
Soil sampling	Composite samples at 10+ locations	Below residential cleanup levels	Expand investigation
Air quality	24–hour monitoring for VOCs, H2S, methane	Below OSHA/EPA limits	SHUTDOWN and notify EPA
Formation pressure	Downhole pressure measurement	Stable or decreasing	Investigate; may indicate migration
3D seismic review	Review available seismic data	No new fracture propagation	Suspend operations pending review
Ceremony	Indigenous–led blessing and observation	As determined by Council	Document observations
Community meeting	Public meeting within 5 miles of site	Held; concerns documented	Address all concerns in writing

C–4.2 Full Groundwater Laboratory Panel

Monthly laboratory analysis shall include:

Parameter Category	Specific Parameters	Method
General Chemistry	pH, conductivity, TDS, hardness, alkalinity	Standard methods

Parameter Category	Specific Parameters	Method
Major Ions	Chloride, sulfate, sodium, potassium, calcium, magnesium	EPA 300.0/200.7
Nutrients	Nitrate, nitrite, ammonia, phosphate	EPA 300.0/350.1
Metals	Arsenic, barium, lead, mercury, chromium, selenium, cadmium, copper, zinc, iron, manganese	EPA 6010/6020/7470
Volatile Organics	Full BTEX, MTBE, 1,4-dioxane, all EPA Method 524.2 compounds	EPA 524.2/8260
Semi-Volatile Organics	PAHs, phenols	EPA 8270
Petroleum Hydrocarbons	GRO, DRO, TPH	EPA 8015
Radionuclides	Gross alpha, gross beta, radium-226, radium-228	EPA 900.0/903.1/904.0
Fracking-Specific	Bromide, strontium, lithium, boron	EPA 200.8/300.0

C-4.3 Soil Sampling Protocol

Monthly soil sampling shall follow this pattern:

1. **Sampling Grid:**
   - Minimum 10 locations per acre
   - Depths: 0-6 inches, 6-24 inches, 24-48 inches, and at water table (if accessible)
2. **Sample Locations:**
   - Former wellhead location
   - Former tank/containment areas
   - Downslope areas
   - Near any historical spill locations
   - Background location (confirmed clean)
3. **Analysis:**
   - TPH (GRO and DRO)
   - BTEX
   - Heavy metals
   - pH

- NORM (if historical NORM detected)

4. **Comparison:**
   - Compare to baseline samples taken before healing began
   - Compare to background location
   - Track trends over time

SECTION C–5: AUTOMATIC SHUTDOWN TRIGGERS

C–5.1 Immediate Shutdown Events

The following events trigger IMMEDIATE cessation of all operations at the site:

Trigger	Threshold	Response Time
Earthquake	2.5 magnitude or greater within 10 miles	IMMEDIATE
Methane at surface	>500 ppm at any monitoring point	IMMEDIATE
Groundwater contamination	Any parameter exceeds MCL	Within 1 hour
Visible leak/spill	Any volume reaching soil or water	IMMEDIATE
Wildlife die–off	3+ animals found dead within 100m of site	Within 1 hour
Indigenous ceremony warning	Council member observes spiritual disturbance	IMMEDIATE
Community health emergency	Any illness potentially linked to site	IMMEDIATE
Ground movement	Any crack, subsidence, or heave observed	IMMEDIATE
Equipment failure	Failure of containment, barrier, or critical system	IMMEDIATE
Fire	Any fire at site	IMMEDIATE (also evacuate)

C–5.2 Shutdown Procedure

Upon any shutdown trigger:

1. **STOP all mechanical operations immediately**
2. **Secure the site** – close all valves, de–energize equipment
3. **Evacuate non–essential personnel**
4. **Notify Earth Protection Enforcement Unit** – within 15 minutes
5. **Notify community** – within 1 hour (for contamination or health events)
6. **Document the trigger** – photographs, measurements, observations

7. **Do NOT resume operations** until:
    - Cause is identified
    - Corrective action is implemented
    - Earth Protection Enforcement Unit authorizes restart
    - Indigenous Earth Council concurs (for ceremony warnings)

C–5.3 Restart Authorization

Operations may only restart after:

1. Written determination of cause
2. Written corrective action plan
3. Implementation of corrective action
4. Verification that trigger condition is resolved
5. Written authorization from Earth Protection Enforcement Unit
6. Concurrence from Indigenous Earth Council (if applicable)
7. Community notification of restart

SECTION C–6: SPECIAL MONITORING REQUIREMENTS

C–6.1 Sacred Site Proximity Monitoring

For sites within 50 miles of a designated sacred site:

Additional Requirement	Frequency	Purpose
Indigenous Earth Council site visit	Monthly	Spiritual assessment
Cultural impact documentation	Monthly	Record any observed impacts
Enhanced vegetation monitoring	Weekly	Detect impacts to medicinal plants
Water quality at nearest sacred water source	Weekly	Protect ceremonial water
Noise/light monitoring	Continuous	Minimize disturbance

C–6.2 Aquifer Protection Zone Monitoring

For sites within 25 miles of a sole–source aquifer or critical water supply:

Additional Requirement	Frequency	Threshold
Additional monitoring wells (minimum 6)	N/A	Install before healing begins
Groundwater sampling	Weekly (not monthly)	More frequent analysis
Tracer testing	Before and after each phase	Confirm no preferential pathways
Real–time groundwater monitoring	Continuous	Automated telemetry alerts

C–6.3 Seismically Active Zone Monitoring

For sites in areas with historical induced seismicity:

Additional Requirement	Frequency	Threshold
On–site seismic monitoring	Continuous	Station within 1 mile
Shutdown threshold	N/A	Any event >1.5 magnitude
Pre–healing seismic survey	Once	Establish baseline
Post–phase seismic survey	After each phase	Detect any changes
Coordination with USGS	Ongoing	Data sharing agreement

SECTION C–7: MONITORING DURATION

C–7.1 Phase–Based Monitoring Schedule

Phase	Duration	Monitoring Level
Phase 1 (Stabilization)	1–6 months	INTENSIVE (daily, weekly, monthly as specified)
Phase 2 (Restoration Fill)	6–24 months	INTENSIVE
Phase 3 (Settling)	3+ years	STANDARD (weekly and monthly only)
Phase 4 (Curing)	5–50 years	REDUCED (monthly and quarterly)
Post–Certification	Permanent	LONG–TERM (annual)

C–7.2 Long–Term Monitoring (Post–Certification)

Even after a site is certified as healed, the following monitoring continues PERMANENTLY:

Parameter	Frequency	Responsible Party
Groundwater quality	Annual	Earth Healing Trust
Methane emissions	Annual	Earth Healing Trust
Ground stability	Annual	Earth Healing Trust
Vegetation health	Annual	Earth Healing Trust
Full site inspection	Every 5 years	Indigenous Earth Council

SECTION C–8: DATA MANAGEMENT AND REPORTING

C–8.1 Data Submission Requirements

Data Type	Submission Deadline	Submit To
Daily logs	Weekly (batch upload)	Earth Healing Trust database
Weekly data	Within 7 days	Earth Healing Trust database
Monthly laboratory	Within 30 days of sample	Earth Healing Trust + EPA

Data Type	Submission Deadline	Submit To
results	collection	
Incident reports	Within 24 hours	Earth Protection Enforcement Unit
Annual summary	January 31 each year	Public record

C–8.2 Public Access to Monitoring Data

All monitoring data shall be:

1. Uploaded to a publicly accessible database within 30 days
2. Available without cost or login requirement
3. Searchable by site, date, parameter, and result
4. Downloadable in standard formats (CSV, PDF)
5. Accompanied by plain–language explanations of significance

C–8.3 Tampering Prohibition

Any falsification, manipulation, or destruction of monitoring data is a federal crime punishable by imprisonment and civil penalties under Title VII of this Act.

SECTION C–9: COMMUNITY MONITORING PARTICIPATION

C–9.1 Community Observer Program

Citizens living within 10 miles of a RECOVER site may:

1. Observe any monitoring event (with 24–hour notice)
2. Receive copies of all monitoring reports
3. Submit observations to the Earth Protection Enforcement Unit
4. Request additional monitoring if concerns arise
5. Participate in monthly community meetings

C–9.2 Community Monitoring Grants

The Earth Repair Fund shall provide grants for:

1. Community air quality monitoring equipment
2. Community water testing programs
3. Training for community monitors
4. Support for community participation in oversight

SECTION C–10: MONITORING CERTIFICATION

C–10.1 Monitor Certification Requirements

All personnel conducting monitoring under this Act must:

Level	Training Required	Can Perform
Level 1	8–hour online course	Visual inspection, odor checks
Level 2	40–hour course + field training	Field sampling, equipment operation
Level 3	200–hour course + 1 year experience	All monitoring; supervise others
Level 4	Indigenous–led training + Council approval	Ceremony and spiritual monitoring

C–10.2 Certification Bodies

Monitoring certifications may be issued by:

1. EPA–approved training programs
2. State environmental agency programs
3. Indigenous Earth Council training programs
4. Accredited university programs

CERTIFICATION

This Monitoring Manual establishes binding minimum standards. Sites may exceed these standards but may not reduce monitoring below these requirements without written approval from the Indigenous Earth Council and the Earth Protection Enforcement Unit.

END OF APPENDIX C: COMPLETE MONITORING MANUAL AND SHUTDOWN PROTOCOLS

APPENDIX D: FILL MATERIAL SPECIFICATIONS AND HEALING LAYER REQUIREMENTS

THE RECOVER ACT — GEOLOGICAL HEALING STANDARDS

This Appendix establishes mandatory specifications for all fill materials used in the RECOVER Healing Protocol. These materials are selected to restore geological integrity, protect groundwater, and return the Earth to her natural conductive state.

SECTION D–1: CORE PRINCIPLE

NOTHING MAY ENTER THE EARTH THAT DID NOT COME FROM THE EARTH.

All fill materials must be: – Naturally sourced (no synthetics) – Non–toxic – Geologically compatible with the original formation – Free of contaminants – Traceable to source

PROHIBITED MATERIALS: – Portland cement – Concrete – Plastic/polymer grouts – Synthetic resins – Any petroleum–derived product – Industrial waste products – Fly ash – Slag – Any material not listed in this Appendix

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SECTION D–2: WELLBORE FILL LAYERS (BOTTOM TO TOP)

D–2.1 Layer Structure Overview

A properly healed wellbore contains the following layers, from deepest to surface:

Layer	Depth Range	Material	Thickness	Function
1 – Deep Formation Seal	Bottom of well to top of fractured zone	Clay slurry + native sediment	Full fracture zone depth	Seal fractures; restore structure
2 – Transition Zone	Above fracture zone	Graded sand/sediment	50–200 feet	Gradual transition; pressure equalization
3 – Aquifer Protection Barrier	At each aquifer crossing	Bentonite clay	20–50 feet per aquifer	Prevent vertical contamination migration
4 – Main Wellbore Fill	Above last aquifer to 50 feet below surface	Native sediment + mineral mix	Variable	Fill void; restore geological column
5 – Calcium/Mineral Restoration Layer	50–100 feet below surface	Calcium carbonate + native minerals	50 feet	Restore mineral conductivity
6 – Root Zone Preparation	6–50 feet below surface	Graded soil + organic matter	44 feet	Support deep–rooted vegetation
7 – Topsoil Layer	0–6 feet	Native topsoil with microbiome	6 feet	Support surface ecosystem

---

SECTION D–3: LAYER 1 — DEEP FORMATION SEAL

D–3.1 Purpose

The Deep Formation Seal fills all fractures created during hydraulic fracturing and restores structural integrity to the fractured rock formation.

D–3.2 Materials

Material	Specification	Source	Proportion

Material	Specification	Source	Proportion
Natural calcium bentonite	API–grade; minimum 80% montmorillonite	Wyoming or equivalent domestic source	20–30% by volume
Native sediment	Matched to original formation geology	On–site or nearby quarry of same formation	50–60% by volume
Calcium calcium powder	Minimum 95% CaCOite	Natural limestone, crushed	10–15% by volume
Clean water	Potable quality; no chlorine	Filtered surface or groundwater	As needed for slurry

D–3.3 Preparation

1. **Geological Assessment:** Core sample and analyze original formation to determine composition
2. **Material Matching:** Select native sediment that matches original formation within 90% mineralogical similarity
3. **Slurry Mixing:** Combine materials in batch mixer to achieve consistent slurry
4. **Quality Testing:** Each batch tested for density (target: 10–12 lb/gal), viscosity, and free water

D–3.4 Placement Procedure

1. **Fracture Mapping:** Use 3D seismic imaging to map all fracture networks
2. **Injection Planning:** Calculate volume required to fill all mapped fractures
3. **Staged Injection:** Pump slurry in stages, allowing each stage to settle before adding more
4. **Pressure Monitoring:** Monitor injection pressure continuously; stop if pressure exceeds formation fracture pressure
5. **Verification:** Confirm fill with post–placement seismic imaging

D–3.5 Acceptance Criteria

Parameter	Requirement	Test Method
Fill completeness	>95% of mapped fractures filled	3D seismic comparison
Permeability	<0.01 millidarcy	Core sample testing
Structural stability	No settlement >2% after 90 days	Pressure monitoring

---

SECTION D–4: LAYER 2 — TRANSITION ZONE

D–4.1 Purpose

The Transition Zone provides gradual geological transition between the sealed fracture zone and the aquifer protection barriers, allowing natural pressure equalization.

D–4.2 Materials

Material	Specification	Source	Proportion
Graded sand	Well–rounded; silica or native composition	Regional sand quarry	60–70%
Fine gravel	1/4 to 1/2 inch diameter	Regional gravel quarry	20–30%
Clay binder	Natural sodium or calcium bentonite	Wyoming or equivalent	5–10%

D–4.3 Placement Procedure

1. **Gradation:** Layer coarser material at bottom, finer at top
2. **Compaction:** Allow natural settling; do not mechanically compact
3. **Hydration:** Add clean water to achieve optimal moisture for settling
4. **Monitoring:** Track settlement for 30 days before proceeding to next layer

---

SECTION D–5: LAYER 3 — AQUIFER PROTECTION BARRIER

D–5.1 Purpose

The Aquifer Protection Barrier is the most critical layer. It prevents vertical migration of any remaining contamination into drinking water aquifers.

D–5.2 Materials

Material	Specification	Source	Installation
Sodium bentonite pellets	High–swelling; minimum 90% montmorillonite	Wyoming source; API–certified	Primary barrier
Granular bentonite	Medium–grade; 8–20 mesh	Same source	Seal pellet interstices
Bentonite grout	Pumpable slurry; 20% solids	Same source	Fill any gaps

D–5.3 Barrier Specifications

Aquifer Type	Minimum Barrier Thickness	Minimum Permeability
Non–drinking water aquifer	20 feet	<1 x 10^–7 cm/sec
Drinking water aquifer	50 feet	<1 x 10^–8 cm/sec
Sole–source aquifer	100 feet	<1 x 10^–9 cm/sec
Within 100 feet of municipal supply	100 feet + additional measures	<1 x 10^–9 cm/sec

D–5.4 Placement Procedure

1. **Aquifer Identification:** Use geophysical logging to identify exact aquifer boundaries

2. **Barrier Placement:** Begin 25 feet below aquifer bottom; extend 25 feet above aquifer top
3. **Pellet Installation:** Pour pellets in measured quantities; allow full hydration (24–48 hours)
4. **Granular Seal:** Add granular bentonite to fill interstices
5. **Grout Injection:** Inject bentonite grout under low pressure to seal any remaining voids
6. **Verification:** Conduct slug test or pump test to verify barrier integrity

D–5.5 Acceptance Criteria

Parameter	Requirement	Test Method
Thickness	Meets or exceeds minimum	Geophysical log
Permeability	Meets or exceeds minimum	Slug test or pump test
Continuity	No gaps or channels	Cement bond log equivalent
Swelling	Full hydration confirmed	Visual/caliper log

SECTION D–6: LAYER 4 — MAIN WELLBORE FILL

D–6.1 Purpose

The Main Wellbore Fill restores the geological column between aquifer protection barriers and the surface, using materials matched to original geology.

D–6.2 Materials

Material	Specification	Source	Use
Native sediment	Matched to original formation	On–site or regional source	Primary fill
Crushed limestone	95%+ $CaCO_3$; 1/4 to 2 inch	Regional quarry	Structural support
Natural sand	Clean; graded	Regional source	Fill fine voids
Clay	Natural sodium or calcium bentonite	Regional or Wyoming	Binder between sections

D–6.3 Placement Procedure

1. **Section Planning:** Divide fill zone into sections matching original geological strata
2. **Material Matching:** Select fill material to match each original stratum
3. **Layered Placement:** Install fill in lifts of 10–20 feet, matching original geology
4. **Compaction:** Allow natural settling; add water if needed for optimal compaction
5. **Verification:** Log fill placement with caliper or density log

---

SECTION D–7: LAYER 5 — CALCIUM/MINERAL RESTORATION LAYER

D–7.1 Purpose

The Calcium/Mineral Restoration Layer restores the natural mineral balance and electrical conductivity of the subsurface, supporting the Earth's natural energy flow.

D–7.2 Materials

Material	Specification	Source	Proportion
Calcium carbonate powder	95%+ purity; food or pharmaceutical grade	Natural limestone	30%
Dolomite powder	Calcium–magnesium carbonate	Natural dolomite quarry	20%
Silica sand	Clean; round grains	Regional source	30%
Native mineral mix	Matched to regional geology	Site–specific analysis	15%
Trace minerals	Iron, manganese, zinc (natural forms)	Natural mineral sources	5%

D–7.3 Mineral Content Targets

Based on regional geology, the mineral restoration layer shall restore the following to natural levels:

Mineral	Target Range	Function
Calcium	5–15% by weight	Structural; conductivity
Magnesium	2–8% by weight	Biological; structural
Silica	20–40% by weight	Structural matrix
Iron	1–5% by weight	Biological; color
Potassium	0.5–2% by weight	Biological; conductivity
Sodium	0.2–1% by weight	Conductivity
Trace elements	Natural background	Ecosystem function

D–7.4 Placement Procedure

1. **Baseline Testing:** Sample native soil/rock at site to determine natural mineral composition
2. **Formula Development:** Develop site–specific mineral mix to match baseline
3. **Mixing:** Combine materials thoroughly in batch mixer
4. **Placement:** Install in 5–foot lifts, allowing settling between lifts
5. **Hydration:** Add clean water to activate mineral bonding

6. **Verification:** Sample installed material to confirm mineral content

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SECTION D–8: LAYER 6 — ROOT ZONE PREPARATION

D–8.1 Purpose

The Root Zone Preparation Layer supports deep–rooted native vegetation, which stabilizes soil, prevents erosion, and reconnects surface ecosystem to subsurface.

D–8.2 Materials

Depth	Material	Specification	Purpose
50–30 feet	Graded gravel/sand	1/8 to 1/2 inch	Drainage; deep root penetration
30–15 feet	Subsoil mix	Regional subsoil + organic matter	Nutrient reservoir
15–6 feet	Enhanced subsoil	Subsoil + 5% compost	Root zone development

D–8.3 Organic Matter Sources

Only the following organic matter sources are permitted:

Source	Permitted	Prohibited
Locally–produced compost	✓	–
Aged manure (>1 year)	✓	–
Biochar (from clean wood)	✓	–
Municipal sewage sludge	–	✗ (heavy metal risk)
Industrial compost	–	✗ (unknown contaminants)
Peat moss	–	✗ (unsustainable harvest)

SECTION D–9: LAYER 7 — TOPSOIL LAYER

D–9.1 Purpose

The Topsoil Layer restores the living surface ecosystem, including soil microbiome, to support native plant communities.

D–9.2 Materials

Component	Specification	Source	Proportion
Native topsoil	Uncontaminated; from similar ecosystem	Regional source	70%
Compost	Mature; locally produced	Local facility	15%

Component	Specification	Source	Proportion
Native seed mix	Species from within 50 miles	Regional seed producer	As specified
Mycorrhizal inoculant	Native species	Certified supplier	Per manufacturer
Cover crop seed	Annual grasses for erosion control	Regional source	As specified

D–9.3 Topsoil Specifications

Parameter	Requirement	Test Method
Organic matter	3–8%	Loss on ignition
pH	6.0–7.5 (or match native)	Standard pH test
Compaction	<250 psi	Penetrometer
Heavy metals	Below residential standards	EPA 6010/6020
Petroleum hydrocarbons	<10 mg/kg	EPA 8015
Microbial activity	Comparable to native soil	Soil respiration test

D–9.4 Native Seed Mix Requirements

Seed mix shall include:

Plant Type	Proportion	Examples
Native grasses	40–60%	Big bluestem, switchgrass, Indian grass
Native forbs	20–30%	Black–eyed Susan, purple coneflower, milkweed
Native legumes	10–20%	Wild indigo, prairie clover, partridge pea
Native shrubs (live plants)	5–10%	Serviceberry, sumac, elderberry
Trees (live plants)	As appropriate	Oak, hickory, native conifers

All species must be native to the region within 100 miles of the site.

SECTION D–10: FILL MATERIAL SOURCING AND CERTIFICATION

D–10.1 Approved Sources

Fill materials may only be sourced from:

1. On–site (if uncontaminated)
2. Certified quarries with environmental compliance record
3. Certified bentonite producers
4. Regionally–appropriate geological sources

D–10.2 Prohibited Sources

Fill materials may NOT be sourced from:

1. Contaminated sites
2. Active mining operations without environmental certification
3. International sources (to prevent invasive species)
4. Unknown or undocumented sources
5. Any source using synthetic processing

D–10.3 Chain of Custody

Every load of fill material must include:

1. Source location (GPS coordinates)
2. Material type and specification
3. Date and time of extraction
4. Transport vehicle identification
5. Date and time of delivery
6. Receiving personnel signature
7. Sample retained for 5 years

SECTION D–11: VOLUME CALCULATIONS

D–11.1 Basic Wellbore Volume

Well Depth	Casing Diameter	Wellbore Volume (per 1,000 ft)
Any	4.5 inches	~10 cubic yards
Any	5.5 inches	~15 cubic yards
Any	7 inches	~25 cubic yards
Any	9.625 inches	~47 cubic yards
Any	13.375 inches	~90 cubic yards

D–11.2 Fracture Zone Volume

Fracture volume depends on: – Number of fracking stages (typically 15–60) – Volume of proppant placed (typically 5,000–15,000 cubic feet per well) – Extent of fracture network

Estimate: Add 50–200% to wellbore volume for fracture fill requirements

D–11.3 Total Material Estimate (Typical Well)

Category	Material Type	Estimated Volume
Deep formation seal	Slurry mix	200–500 cubic yards
Transition zone	Graded fill	50–150 cubic yards
Aquifer barriers (3 aquifers)	Bentonite	75–200 cubic yards
Main wellbore fill	Native sediment	300–800 cubic yards

Category	Material Type	Estimated Volume
Mineral restoration layer	Calcium mix	50–100 cubic yards
Root zone	Graded soil	100–250 cubic yards
Topsoil	Native topsoil	50–150 cubic yards
TOTAL		**825–2,150 cubic yards per well**

SECTION D–12: QUALITY CONTROL

D–12.1 Material Testing Requirements

Material	Tests Required	Frequency
Bentonite	Swell index, moisture, purity	Every shipment
Native sediment	Grain size, mineralogy, contamination screen	Every source; every 100 cubic yards
Limestone/calcium	$CaCO_3$ content, purity	Every shipment
Topsoil	Full soil analysis	Every 50 cubic yards
Seed mix	Purity, germination, weed seed	Every lot

D–12.2 Installation Verification

Phase	Verification Method	Documentation
Each layer	Depth measurement	Placement log
Aquifer barriers	Integrity testing	Test report
Final installation	Geophysical log	Log record
Surface restoration	Photographic record	Photo log

CERTIFICATION

All fill materials and installation procedures under this Appendix shall be certified by a licensed Professional Geologist or Professional Engineer with relevant experience, and verified by the Indigenous Earth Council before proceeding to the next phase of healing.

END OF APPENDIX D: FILL MATERIAL SPECIFICATIONS AND HEALING LAYER REQUIREMENTS

APPENDIX E: HISTORICAL TIMELINE

167 YEARS OF EXTRACTION — 196 YEARS OF SEPARATION

This Appendix documents the parallel timelines of fossil fuel extraction in America and the legal separation of Native America from America. These two histories are inseparable: the same hands that pushed indigenous peoples off the land began bleeding her dry.

SECTION E–1: TWO TIMELINES, ONE WOUND

Timeline	Beginning	Duration	Status
Separation of Native America from America	1830 (Indian Removal Act)	196 years	Still in effect
Industrial extraction from the Earth	1859 (First commercial oil well)	167 years	Still ongoing
Time between separation and drilling	29 years	—	Cause and effect

America existed for only 54 years (1776–1830) before it began removing indigenous peoples from their land.

America existed for only 83 years (1776–1859) before it began drilling into the Earth.

For 67% of America's existence, we have been extracting from her body.

SECTION E–2: TIMELINE OF INDIGENOUS SEPARATION

E–2.1 Pre–Colonial Era

Period	Indigenous Presence	Land Stewardship
15,000+ years ago – 1492	Full stewardship of all land	Sustainable; regenerative
Estimated population (1492)	5–15 million in present–day U.S.	Thriving nations
Land "ownership"	Held in sacred trust	No extraction; no exploitation

E–2.2 Colonial Era (1492–1776)

Year	Event	Impact
1492	Columbus arrives	Beginning of colonization
1607	Jamestown established	First permanent English settlement
1620	Plymouth Colony	Pilgrim settlement on Wampanoag land
1622–1644	Powhatan Wars	First major English–Indigenous conflict
1675–1678	King Philip's War	40% of New England tribes killed
1763	Royal Proclamation	British attempt to limit western expansion
1776	Declaration of Independence	America founded on indigenous land

E–2.3 Early Republic (1776–1830)

Year	Event	Impact
1778	First U.S.–Tribal Treaty (Delaware)	Established treaty–making as policy
1783	Treaty of Paris	Britain cedes land it never owned
1787	Northwest Ordinance	Federal policy to "manage" tribal lands
1790	Trade and Intercourse Act	Required federal approval for land transfers
1803	Louisiana Purchase	U.S. buys land from France (not from tribes)
1823	Johnson v. McIntosh	Supreme Court: "Discovery Doctrine" — tribes cannot sell land
1830	**INDIAN REMOVAL ACT**	**Legal separation of Native America from America begins**

E–2.4 The Removal Era (1830–1850)

Year	Event	Deaths/Displacement
1830	Indian Removal Act signed by Andrew Jackson	Authorization for ethnic cleansing
1831	Cherokee Nation v. Georgia	Supreme Court calls tribes "domestic dependent nations"
1832	Worcester v. Georgia	Supreme Court rules for Cherokee; Jackson ignores it
1836	Creek removal begins	3,500 die during removal
1837	Chickasaw removal	Forced march to Oklahoma
1838–1839	**TRAIL OF TEARS**	**15,000+ Cherokee, Muscogee, Seminole, Chickasaw, Choctaw die**
1842	Seminole Wars end	Survivors removed to Oklahoma
1850	California Indian genocide begins	80% of California Indians killed by 1870

E–2.5 Reservation Era (1850–1934)

Year	Event	Impact
1851	Indian Appropriations Act	Creates reservation system
1851	Fort Laramie Treaty	Recognizes Lakota territory (later violated)
1862	Dakota War; mass execution	38 Dakota men hanged; largest mass execution in U.S. history
1864	Sand Creek Massacre	150+ Cheyenne and Arapaho killed by U.S. troops
1868	Fort Laramie Treaty (second)	Recognizes Black Hills as Lakota territory

Year	Event	Impact
1871	Indian Appropriations Act	Ends treaty–making; tribes no longer "nations"
1876	Battle of Little Bighorn	Lakota victory; followed by punitive campaigns
1877	Black Hills seized	U.S. violates 1868 treaty for gold
1879	Carlisle Indian School opens	"Kill the Indian, save the man" — forced assimilation
1887	**DAWES ACT**	**Breaks up tribal lands; 90 million acres lost**
1890	Wounded Knee Massacre	300+ Lakota killed, including women and children
1924	Indian Citizenship Act	Native Americans finally granted citizenship in their own land

E–2.6 Termination and Self–Determination Era (1934–Present)

Year	Event	Impact
1934	Indian Reorganization Act	Ends allotment; some restoration
1953	Termination Policy begins	Federal recognition ended for 100+ tribes
1956	Indian Relocation Act	Urban relocation program; cultural disruption
1968	Indian Civil Rights Act	Extends some constitutional protections
1975	Indian Self–Determination Act	Tribes can contract federal programs
1978	American Indian Religious Freedom Act	Protects (somewhat) religious practices
1988	Indian Gaming Regulatory Act	Economic opportunity through gaming
1990	Native American Graves Protection Act	Protects burial sites (with exceptions)
2016	Standing Rock protests	Dakota Access Pipeline resistance
2020	McGirt v. Oklahoma	Supreme Court affirms Muscogee reservation
2026	**RECOVER ACT introduced**	**First legislation to fully restore indigenous authority over land healing**

SECTION E–3: TIMELINE OF EXTRACTION

E–3.1 Pre–Industrial Era

Period	Extraction Activity	Scale
Pre–1859	Surface oil seeps, salt wells, small coal mines	Minimal; local
Indigenous use	Oil seeps used for medicine, waterproofing	Sustainable; small–scale

E–3.2 The Birth of Industrial Extraction (1859–1900)

Year	Event	Significance
1859	**FIRST COMMERCIAL OIL WELL** (Titusville, PA)	**Industrial extraction begins**

Year	Event	Significance
1861	First oil refinery	Processing infrastructure established
1863	Oil pipeline (Pennsylvania)	Transport infrastructure
1865	First oil well in West Virginia	Expansion beyond Pennsylvania
1870	Standard Oil founded	Corporate consolidation begins
1876	First oil well in California	Western expansion
1882	Standard Oil Trust formed	Monopoly power
1889	First oil well in Texas	Gulf Coast development begins
1892	First oil well in Oklahoma	Oklahoma oil era begins
1895	First offshore well (California)	Extraction moves into ocean
By 1900	~200,000 wells drilled (cumulative)	First major wave complete

E–3.3 The Gusher Era (1901–1950)

Year	Event	Significance
1901	**SPINDLETOP GUSHER** (Texas)	Modern oil age begins; 100,000 barrels/day
1902	Texaco founded	Major oil company formation
1908	Model T introduced	Mass automobile market created
1911	Standard Oil broken up	But fragments become major companies
1914	First drive–through gas station	Oil infrastructure becomes ubiquitous
1920	Oklahoma becomes #1 oil state	300,000+ barrels/day
1921	Teapot Dome scandal	Corruption in oil leasing exposed
1930	East Texas oil field discovered	Largest field in lower 48
1935	Connally Hot Oil Act	Federal regulation of oil transport
1938	Natural gas discovered (Texas Panhandle)	Gas extraction expands
1939	First offshore platform (Gulf of Mexico)	Deepwater extraction begins
1947	**FIRST HYDRAULIC FRACTURING TEST**	**Fracking technology invented**
1949	First commercial fracking operation	Fracking deployed at scale
By 1950	~1,000,000 wells drilled (cumulative)	Second major wave complete

E–3.4 The Offshore and Deepwater Era (1950–2000)

Year	Event	Significance
1953	Outer Continental Shelf Lands Act	Federal control of offshore resources
1956	First offshore well beyond sight of land	Technology advances
1968	Prudhoe Bay discovered (Alaska)	Largest U.S. oil field
1969	Santa Barbara oil spill	3 million gallons; environmental movement

Year	Event	Significance
		catalyst
1970	U.S. oil production peaks	Beginning of decline
1970	Clean Air Act	Environmental regulation begins
1970	Environmental Protection Agency created	Federal environmental oversight
1972	Clean Water Act	Water pollution regulation
1973	OPEC oil embargo	Energy crisis; "energy independence" rhetoric
1977	Trans-Alaska Pipeline	800 miles; 2 million barrels/day capacity
1979	Three Mile Island	Nuclear alternative falters
1980	**BENTSEN AMENDMENT**	**Fracking waste exempted from hazardous waste rules**
1989	Exxon Valdez oil spill	11 million gallons; Alaska devastation
1997	**MITCHELL ENERGY PERFECTS SLICKWATER FRACKING**	**Modern fracking era begins**
By 2000	~1,900,000 wells drilled (cumulative)	Third wave complete

E-3.5 The Fracking Boom (2000-Present)

Year	Event	Significance
2000	Barnett Shale boom begins	First major shale play
2005	**ENERGY POLICY ACT**	**"Halliburton Loophole" — fracking exempted from Safe Drinking Water Act**
2006	Bakken Shale production begins	North Dakota boom
2008	Marcellus Shale production begins	Pennsylvania/Ohio boom
2010	Deepwater Horizon disaster	4.9 million barrels spilled; 11 workers killed
2010	Eagle Ford Shale production begins	South Texas boom
2011	Pavillion, Wyoming contamination confirmed	EPA links fracking to groundwater contamination
2011	Prague, Oklahoma earthquake (5.7)	Largest injection-induced earthquake
2012	Permian Basin horizontal drilling boom	Texas/New Mexico

Year	Event	Significance
2015	U.S. becomes world's largest oil producer	Fracking transforms global energy
2015	Paris Climate Agreement	Global commitment to reduce emissions
2016	**STANDING ROCK PROTESTS**	**Indigenous resistance to Dakota Access Pipeline**
2016	Oklahoma: 900+ earthquakes/year	Induced seismicity crisis
2020	COVID-19 oil price crash	Temporary demand collapse
2021	Infrastructure Investment and Jobs Act	$4.7 billion for orphan well plugging
2023	Permian Basin produces 5+ million barrels/day	Peak extraction
2026	**RECOVER ACT INTRODUCED**	**First legislation mandating full healing**
By 2026	~2,500,000+ wells drilled (cumulative)	Ongoing

SECTION E-4: WELLS DRILLED VS. WELLS HEALED

E-4.1 The Count

Category	Count	Source
Total wells ever drilled (U.S.)	2,500,000+	IOGCC, EIA
Currently active wells	~900,000	EIA, 2022
Documented abandoned wells	1,100,000+	IOGCC, 2021
Documented orphan wells	130,000+	IOGCC, 2020
Estimated undocumented orphan wells	800,000–1,000,000	EDF, 2021
Wells plugged with cement	~500,000	State records (estimate)
Wells restored to ecological standards	**0**	No standard exists
Wells fully healed per RECOVER standards	**0**	Standard created by this Act

E-4.2 The Chart: Drilled vs. Healed

WELLS DRILLED VS. WELLS HEALED (1859–2026)



Percentage healed: 0.000%

E–4.3 Annual Drilling Rate (Selected Years)

Year	Wells Drilled That Year	Cumulative Total
1860	~500	~500
1880	~3,000	~45,000
1900	~8,000	~160,000
1920	~25,000	~450,000
1940	~30,000	~850,000
1960	~40,000	~1,300,000
1980	~70,000	~1,800,000
2000	~25,000	~1,950,000
2010	~40,000	~2,100,000
2020	~15,000	~2,400,000
2025	~20,000 (est.)	~2,500,000

SECTION E–5: THE CONNECTION

E–5.1 The Pattern

Action Against Indigenous Peoples	Action Against the Earth	Year Gap
Indian Removal Act	First commercial oil well	29 years
Trail of Tears	Standard Oil monopoly	32 years
Dawes Act (land breakup)	Spindletop gusher	14 years
Termination Policy	Fracking invented	6 years
Standing Rock protests	RECOVER Act	10 years

E–5.2 The Lesson

The same ideology that justified removing indigenous peoples from their land — the belief that land exists to be exploited for profit — also justified drilling into the Earth without consent, healing, or restoration.

To heal the Earth, we must also heal the separation.

The RECOVER Act does both.

SECTION E–6: COMPARATIVE TIMELINE

Year	Indigenous History	Extraction History

Year	Indigenous History	Extraction History
1830	Indian Removal Act	—
1838	Trail of Tears	—
1859	—	First commercial oil well
1870	—	Standard Oil founded
1876	Black Hills seized	—
1887	Dawes Act breaks up tribal lands	—
1890	Wounded Knee Massacre	—
1901	—	Spindletop gusher
1924	Indigenous people finally get citizenship	—
1947	—	Fracking invented
1953	Termination policy begins	—
1980	—	Fracking waste exempted from regulation
2005	—	Halliburton Loophole
2016	Standing Rock resistance	—
2026	RECOVER Act: Indigenous authority restored	RECOVER Act: Mandatory healing begins

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SECTION E–7: THE PATH FORWARD

E–7.1 What Must Be Healed

Wound	Duration	RECOVER Solution
Separation of indigenous peoples from land stewardship	196 years	Indigenous Earth Council with binding authority
Extraction without healing	167 years	Mandatory RECOVER Healing Protocol
Broken treaties	195+ years	Consent requirement; veto power over ancestral lands
Denial of indigenous knowledge	200+ years	Traditional ecological knowledge legally equal
Environmental racism	196 years	Prioritize healing in indigenous communities

E–7.2 The Vision

The RECOVER Act is not just environmental legislation.

It is an act of restoration — of the land, and of the relationship between America and Native America.

For 196 years, we separated them from the land.

For 167 years, we bled her dry.

On August 1, 2026, we begin to heal both wounds.

CERTIFICATION

This historical timeline is compiled from federal government records, academic sources, and indigenous historical accounts. It represents a summary of documented events and is not exhaustive.

END OF APPENDIX E: HISTORICAL TIMELINE

APPENDIX F: INDIGENOUS FRAMEWORK AND EARTH ENERGY MEASUREMENT

THE RECOVER ACT — HONORING INDIGENOUS WISDOM AND THE EARTH'S ENERGY

This Appendix establishes the framework for indigenous leadership in land healing, protocols for ceremony and traditional knowledge integration, and the Earth Energy Units (EEU) measurement system for assessing the Earth's energetic health.

SECTION F–1: FOUNDATIONAL PRINCIPLES

F–1.1 Recognition of Indigenous Authority

The United States Congress recognizes that:

1. Indigenous peoples of this land stewarded it sustainably for more than 15,000 years before European contact
2. Indigenous nations possess traditional ecological knowledge developed over millennia that is essential to land healing
3. The separation of indigenous peoples from land stewardship (1830–present) coincided with the onset of industrial extraction (1859–present)
4. Healing the land requires healing the relationship between America and Native America
5. Indigenous authority over land healing is not granted by this Act — it is recognized and restored by this Act

F–1.2 Core Principles of Indigenous Land Stewardship

Principle	Meaning	Application in RECOVER

Principle	Meaning	Application in RECOVER
Reciprocity	What is taken must be returned	Mandatory healing, not just closure
Seven Generations	Decisions affect descendants	Permanent curing periods
All My Relations	All beings are connected	Ecosystem–wide monitoring
Sacred Trust	Land is not owned but held in trust	Land returned to stewardship
Consent	Permission must be obtained	Written consent for all extraction
Ceremony	Healing requires spiritual practice	Indigenous–led ceremony at every phase

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SECTION F–2: THE INDIGENOUS EARTH COUNCIL

F–2.1 Composition

The Indigenous Earth Council shall be composed of:

Category	Representatives	Selection
Federally recognized tribes (voting)	One per tribe electing to participate	Appointed by tribal government
State–recognized tribes (voting)	One per tribe electing to participate	Appointed by tribal organization
Indigenous environmental organizations (non–voting advisory)	Up to 10 representatives	Selected by Council
Environmental science advisors (non–voting)	Up to 10 advisors	Selected by Council
Traditional knowledge keepers (non–voting advisory)	Up to 20 elders	Nominated by tribal members

F–2.2 Officers

Position	Selection	Term	Authority
President	Elected by voting members	4 years; 2 term limit	Signs vetoes; represents Council
Vice President	Elected by voting members	4 years; 2 term limit	Acts when President unavailable
Secretary	Elected by voting members	4 years; no limit	Records and communications
Treasurer	Elected by voting members	4 years; no limit	Financial oversight
Regional Chairs	Elected by region	4 years; 2 term	Regional coordination

Position (6)	Selection	Term limit	Authority

F–2.3 Powers and Duties

Power	Scope	Limitation
Veto over extraction permits	Within 100 miles of sacred sites	Requires majority vote of full Council
Designation of sacred sites	Anywhere in U.S.	Based on traditional knowledge and ceremony
Certification of healed sites	All RECOVER sites	Joint with scientific verification
Approval of healing protocols	All RECOVER sites	May add requirements, not reduce
Training and certification	Ceremony Leaders (Level 4)	Traditional knowledge basis
Advisory to Congress	Earth protection policy	Non–binding recommendations

F–2.4 Meeting Requirements

Meeting Type	Frequency	Quorum	Location
Full Council	Quarterly	50% of voting members	Rotating among regions
Executive Committee	Monthly	4 of 6 officers	Virtual or in–person
Regional meetings	Monthly	Regional members	Regional center
Emergency session	As needed	25% can call; 50% for action	Virtual permitted

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SECTION F–3: SACRED SITE DESIGNATION

F–3.1 Criteria for Sacred Site Designation

A site may be designated sacred by the Indigenous Earth Council based on:

Criterion	Evidence Required	Designation Level
Historical ceremonial use	Oral history; archaeological evidence	Level 1 (Protected)
Burial grounds	Documentation; tribal records	Level 2 (Highly Protected)
Vision quest or prayer sites	Traditional knowledge testimony	Level 1 (Protected)
Medicine gathering areas	Traditional ecological knowledge	Level 1 (Protected)
Treaty–designated sacred areas	Treaty documents	Level 2 (Highly

Criterion	Evidence Required	Designation Level
		Protected)
Active ceremonial use	Current practice documentation	Level 2 (Highly Protected)
Ancestral village sites	Archaeological; oral history	Level 1 (Protected)
Water sources of ceremonial significance	Traditional knowledge	Level 2 (Highly Protected)
Sites of spiritual significance	Tribal testimony	Level 1 (Protected)
Massacre sites; sites of historical trauma	Historical records	Level 2 (Highly Protected)

F–3.2 Protection Levels

Level	Extraction Allowed	Healing Priority	Access
Level 1: Protected	Veto available; consent required	High priority	Tribal access guaranteed
Level 2: Highly Protected	No extraction ever; existing must cease	Immediate priority	Exclusive tribal access
Level 3: Sacred Corridor	No extraction; buffer zone	Integrated healing	Tribal management

F–3.3 Designation Process

1. **Nomination:** Any federally or state–recognized tribe may nominate a site
2. **Documentation:** Tribal historian prepares supporting documentation
3. **Traditional Knowledge Review:** Council of elders reviews cultural significance
4. **Site Visit:** Council delegation visits site with tribal representatives
5. **Ceremony:** Traditional ceremony conducted at site (optional but recommended)
6. **Council Vote:** Majority of full voting membership required for designation
7. **Federal Registration:** Designated sites registered with EPA and BLM
8. **Public Notice:** Designation published in Federal Register

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SECTION F–4: CEREMONY PROTOCOLS

F–4.1 Role of Ceremony in Healing

Ceremony is not optional decoration; it is essential to the healing process. Indigenous peoples understand that the Earth has a spiritual dimension that must be addressed alongside the physical.

Phase of Healing	Ceremony Purpose	Led By
Pre-healing assessment	Ask permission; listen to the land	Traditional knowledge keeper
Phase 1 (Stabilization)	Acknowledge harm; begin healing relationship	Ceremony leader
Phase 2 (Restoration Fill)	Bless materials; honor Earth receiving her own	Ceremony leader
Phase 3 (Settling)	Quiet observation; allow natural processes	Periodic visits by elders
Phase 4 (Curing)	Ongoing prayer; witness recovery	Community ceremony
Certification	Celebration; thanksgiving; welcome back	Full community ceremony
Post-healing	Annual remembrance; continued relationship	Tribal community

F-4.2 Ceremony Leader Certification (Level 4)

Requirement	Details	Verification
Indigenous heritage	Member of federally or state-recognized tribe	Tribal enrollment
Traditional training	Apprenticeship with recognized knowledge keeper	Knowledge keeper attestation
Community standing	Good standing in tribal community	Tribal council letter
Cultural knowledge	Demonstrated knowledge of traditions	Oral examination by Council
Environmental understanding	Basic RECOVER protocol training	Level 2 Healer certification
Council approval	Approved by Indigenous Earth Council	Council vote

F-4.3 Ceremony Guidelines

Guideline	Requirement
Respect	All participants approach with humility and respect
Confidentiality	Sacred practices not photographed or recorded without permission
Participation	Non-indigenous participants follow ceremony leader guidance
Offerings	Traditional offerings provided (tobacco, sage, etc.)
Timing	Ceremonies conducted at appropriate times (often sunrise/sunset)
Language	Ceremonies may be conducted in indigenous languages
Silence	Periods of silence honored

Guideline	Requirement
Sacred objects	Handling only as directed by ceremony leader

F–4.4 Compensation for Ceremony Leaders

Service	Minimum Compensation	Funding Source
Pre–healing ceremony	$500 + travel	Earth Repair Fund
Phase ceremonies (each)	$750 + travel	Earth Repair Fund
Certification ceremony	$1,000 + travel	Earth Repair Fund
Annual remembrance	$500 + travel	Earth Healing Trust
Emergency/special ceremony	$750 + travel	Earth Repair Fund
Ongoing consultation	$75/hour	Earth Repair Fund

Note: These are minimums. Tribes may negotiate higher compensation. Ceremony leaders may also choose to serve without compensation as a spiritual practice.

SECTION F–5: TRADITIONAL ECOLOGICAL KNOWLEDGE (TEK)

F–5.1 Legal Standing

Traditional ecological knowledge shall be:

1. **Legally equivalent** to Western scientific knowledge in all RECOVER proceedings
2. **Admissible** as evidence in any enforcement action
3. **Binding** when incorporated into healing protocols
4. **Protected** from unauthorized use or publication
5. **Respected** as intellectual property of indigenous peoples

F–5.2 Integration with Scientific Methods

Situation	Approach
TEK and science agree	Proceed with combined understanding
TEK and science differ	Both perspectives documented; Council makes final determination
TEK provides information science lacks	TEK accepted; scientific study may follow
Science provides information TEK lacks	Scientific data incorporated with TEK context
Conflict between TEK and corporate science	TEK presumed accurate absent clear contrary evidence

F–5.3 Protection of Traditional Knowledge

Protection	Application
Consent required	TEK may not be used without tribal consent
Attribution required	All use of TEK must credit source tribe
Sacred knowledge protected	Some knowledge may be restricted from public disclosure
Compensation	Commercial use of TEK requires compensation agreement
Withdrawal	Tribes may withdraw previously shared knowledge

SECTION F–6: EARTH ENERGY UNITS (EEU) MEASUREMENT SYSTEM

F–6.1 Purpose

The Earth Energy Units (EEU) system measures the energetic and spiritual health of the Earth, recognizing that physical healing alone is insufficient. The Earth has electromagnetic, geomagnetic, and subtle energy properties that must be restored.

F–6.2 Components of EEU Measurement

Component	What It Measures	Method
Schumann Resonance	Earth's electromagnetic pulse (7.83 Hz baseline)	Electromagnetic monitoring
Geomagnetic Field Strength	Local magnetic field intensity	Magnetometer
Ley Line Conductivity	Energy flow along traditional energy pathways	Traditional knowledge + electromagnetic mapping
Water Memory	Energetic quality of groundwater	Crystallization patterns; traditional assessment
Biophonic Index	Sound health of ecosystem	Acoustic monitoring
Vegetation Vitality	Life force of plant communities	Kirlian photography; traditional observation
Animal Presence	Return of native species	Wildlife surveys; traditional observation
Spiritual Atmosphere	Qualitative assessment of site "feeling"	Indigenous ceremony; traditional knowledge

F–6.3 EEU Scale

EEU Rating	Description	Site Status
0–10	Severely disrupted	Active extraction or recent abandonment
11–30	Damaged	Early healing phase

EEU Rating	Description	Site Status
31–50	Recovering	Mid-healing phase
51–70	Stabilizing	Late healing phase
71–85	Restored	Approaching certification
86–95	Healed	Certified; curing period
96–100	Thriving	Fully restored; sacred potential

F-6.4 EEU Assessment Protocol

Phase	Assessment	Assessors	Frequency
Baseline	Full EEU assessment before healing	Mixed team: scientists + indigenous	Once
Phase 1–2	Abbreviated assessment	Mixed team	Monthly
Phase 3	Full assessment	Mixed team	Quarterly
Phase 4	Full assessment	Mixed team	Annually
Certification	Comprehensive assessment	Full team + Council	Once
Post-certification	Monitoring assessment	Rotating team	Every 5 years

F-6.5 Certification EEU Requirements

Site Condition	Minimum EEU for Certification	Additional Requirements
Lightly damaged	80	3 consecutive quarterly ratings
Moderately damaged	75	4 consecutive quarterly ratings
Heavily damaged	70	6 consecutive quarterly ratings
Critically damaged	65	8 consecutive quarterly ratings + Council ceremony
Sacred site	85	Full ceremony; unanimous Council approval

SECTION F-7: INDIGENOUS EARTH COUNCIL TRAINING PROGRAMS

F-7.1 Training Offered

Program	Duration	Certification
Traditional Ecological Knowledge Basics	40 hours	TEK Observer
Indigenous Land Ethics	20 hours	Required for all RECOVER

Program	Duration	Certification
		workers
Ceremony Participation	8 hours	Required for site access
EEU Assessment	80 hours	EEU Assessor
Healing Protocol Integration	120 hours	Integrated Healer
Ceremony Leadership	Traditional apprenticeship	Level 4 Ceremony Leader

F–7.2 Training Locations

Training shall be offered at:

1. Tribal colleges and universities
2. Indigenous Earth Council regional centers
3. On–site at active RECOVER locations
4. Virtual (for introductory courses only)

F–7.3 Training Instructors

Course Type	Instructor Requirements
Indigenous ethics and knowledge	Indigenous instructor with Council approval
Scientific methods	Credentialed scientist with TEK training
EEU assessment	Mixed team: scientist + traditional knowledge keeper
Ceremony	Indigenous ceremony leader only

SECTION F–8: LAND RETURN PROTOCOL

F–8.1 Priority for Healed Land Transfer

When a site is certified as healed and eligible for transfer under Title XI:

Priority	Recipient Category	Conditions
1	Original indigenous nation(s)	Ancestral territory; automatic offer
2	Regional indigenous nation(s)	If original nation declines
3	Inter–tribal land trust	Collective indigenous stewardship
4	Indigenous–led conservation organization	Conservation use
5	Community Healing Brigade	Local community stewardship
6	Non–indigenous healers	Only after indigenous options exhausted

F–8.2 Conditions of Indigenous Land Return

Condition	Requirement
No extraction	Permanent prohibition; runs with land

Condition	Requirement
Ceremonial access	Other tribes may access for ceremony with permission
Conservation easement	Permanent ecological protection
Stewardship plan	25-year stewardship plan required
Annual reporting	Report to Earth Healing Trust annually
Assistance available	Technical and financial assistance available

F-8.3 Rejection of Transfer

If an indigenous nation rejects land transfer, they shall not be required to accept it. The land proceeds to the next priority category.

SECTION F-9: COMPENSATION AND FUNDING

F-9.1 Indigenous Earth Council Funding

Budget Category	Annual Allocation	Source
Council operations	$50 million	Earth Repair Fund
Regional centers (6)	$15 million each ($90M total)	Earth Repair Fund
Training programs	$30 million	Earth Repair Fund
Ceremony compensation	$20 million	Earth Repair Fund
Traditional knowledge preservation	$25 million	Earth Repair Fund
Land acquisition for return	$100 million	Earth Repair Fund
TOTAL	**$315 million/year**	

F-9.2 Compensation for Indigenous Participation

Role	Compensation
Council member (voting)	Per diem + travel for meetings
Council officer	Part-time salary ($75,000-$150,000) + travel
Regional chair	Part-time salary ($100,000) + travel
Knowledge keeper advisor	$75/hour + travel
Ceremony leader	Per-ceremony fee (see F-4.4)
TEK consultant	$75/hour + travel
EEU assessor (indigenous)	$75/hour + travel
Training instructor	$100/hour + travel

SECTION F-10: DISPUTE RESOLUTION

F–10.1 Internal Indigenous Disputes

Disputes between tribes regarding sacred site designation, healing protocols, or other Council matters shall be resolved by:

1. Mediation by neutral tribal elder(s)
2. Traditional peacemaking processes
3. Council vote (if mediation fails)
4. No federal court involvement unless constitutional rights violated

F–10.2 Disputes with Federal Agencies

Disputes between the Indigenous Earth Council and federal agencies shall be resolved by:

1. Direct negotiation
2. Mediation by independent mediator
3. Administrative appeal
4. Federal court (Council has standing to sue)

CERTIFICATION

This Indigenous Framework recognizes that true land healing requires restoring indigenous authority and integrating traditional knowledge. The Earth Energy Units system acknowledges that the Earth has energetic and spiritual dimensions that must be healed alongside the physical.

We cannot heal her body while ignoring her spirit.

END OF APPENDIX F: INDIGENOUS FRAMEWORK AND EARTH ENERGY MEASUREMENT

APPENDIX G: STATE–BY–STATE WELL DATA AND PRIORITY SITES

THE RECOVER ACT — GEOGRAPHIC SCOPE OF THE CRISIS

This Appendix documents the number, status, and condition of oil and gas wells in each state, identifying priority sites for immediate healing action.

SECTION G–1: NATIONAL OVERVIEW

G–1.1 Summary Statistics

Metric	Count	Source
Total wells ever drilled (U.S.)	2,500,000+	IOGCC/EIA

Metric	Count	Source
Currently active wells	~900,000	EIA 2022
Documented abandoned wells	1,100,000+	IOGCC 2021
Documented orphan wells	130,000+	IOGCC 2020
Estimated undocumented orphans	800,000–1,000,000	EDF 2021
Wells plugged (cement only)	~500,000	State records
Wells fully healed (RECOVER standard)	**0**	No standard existed

G–1.2 Top 10 States by Well Count

Rank	State	Total Wells (Historical)	Active	Abandoned	Orphan (Documented)
1	Texas	450,000+	180,000+	200,000+	6,300+
2	Oklahoma	200,000+	40,000+	100,000+	18,000+
3	Pennsylvania	180,000+	8,000+	100,000+	27,000+
4	California	150,000+	50,000+	70,000+	5,500+
5	Kansas	150,000+	25,000+	80,000+	25,000+
6	Ohio	100,000+	20,000+	60,000+	20,000+
7	West Virginia	90,000+	10,000+	50,000+	6,000+
8	New Mexico	70,000+	25,000+	30,000+	700+
9	Louisiana	65,000+	25,000+	30,000+	4,500+
10	Kentucky	60,000+	5,000+	40,000+	14,000+

SECTION G–2: STATE–BY–STATE DATA

ALABAMA

Metric	Count
Total historical wells	~8,000
Active wells	~3,500
Abandoned wells	~3,500
Documented orphan wells	~200
Primary formation(s)	Black Warrior Basin
Primary contaminants	Methane, produced water
Estimated healing cost	$200–500 million
Priority sites	Black Warrior Basin; Mobile Bay area

ALASKA

Metric	Count

Metric	Count
Total historical wells	~4,000
Active wells	~2,000
Abandoned wells	~1,500
Documented orphan wells	~50
Primary formation(s)	North Slope; Cook Inlet
Primary contaminants	Oil spills; permafrost disruption
Estimated healing cost	$500 million – $2 billion
Priority sites	Prudhoe Bay; Cook Inlet platforms
Special considerations	Permafrost; Arctic ecosystem; Indigenous lands

ARKANSAS

Metric	Count
Total historical wells	~15,000
Active wells	~3,000
Abandoned wells	~10,000
Documented orphan wells	~700
Primary formation(s)	Fayetteville Shale; Smackover
Primary contaminants	Methane; fracking fluids
Estimated healing cost	$300–800 million
Priority sites	Fayetteville Shale area; El Dorado region

CALIFORNIA

Metric	Count
Total historical wells	150,000+
Active wells	~50,000
Abandoned wells	~70,000
Documented orphan wells	5,500+
Primary formation(s)	Kern County; Los Angeles Basin; San Joaquin
Primary contaminants	Oil; benzene; methane; produced water
Estimated healing cost	$5–15 billion
Priority sites	Kern County; Los Angeles urban wells; coastal
Special considerations	Urban wells near homes/schools; earthquake risk

COLORADO

Metric	Count

Metric	Count
Total historical wells	~55,000
Active wells	~25,000
Abandoned wells	~25,000
Documented orphan wells	~400
Primary formation(s)	Denver–Julesburg Basin; Piceance Basin
Primary contaminants	Methane; benzene; produced water
Estimated healing cost	$1–3 billion
Priority sites	Weld County; urban interface areas
Special considerations	Residential proximity; earthquake increase

KANSAS

Metric	Count
Total historical wells	150,000+
Active wells	~25,000
Abandoned wells	~80,000
Documented orphan wells	25,000+
Primary formation(s)	Hugoton Gas Field; multiple oil plays
Primary contaminants	Methane; produced water; legacy contamination
Estimated healing cost	$3–8 billion
Priority sites	Central Kansas Uplift; legacy oil fields
Special considerations	Very high orphan well count; agricultural land

KENTUCKY

Metric	Count
Total historical wells	~60,000
Active wells	~5,000
Abandoned wells	~40,000
Documented orphan wells	14,000+
Primary formation(s)	Appalachian Basin; Big Sandy gas field
Primary contaminants	Methane; legacy oil/brine
Estimated healing cost	$1–3 billion
Priority sites	Eastern Kentucky; legacy oil belt

LOUISIANA

Metric	Count

Metric	Count
Total historical wells	~65,000
Active wells	~25,000
Abandoned wells	~30,000
Documented orphan wells	4,500+
Primary formation(s)	Haynesville Shale; Gulf Coast
Primary contaminants	Produced water; oil; H2S
Estimated healing cost	$2–5 billion
Priority sites	Haynesville area; coastal erosion zone
Special considerations	Wetlands; coastal subsidence; hurricane exposure

MICHIGAN

Metric	Count
Total historical wells	~30,000
Active wells	~5,000
Abandoned wells	~20,000
Documented orphan wells	~200
Primary formation(s)	Antrim Shale; Niagaran reefs
Primary contaminants	Methane; produced water
Estimated healing cost	$500 million – $1.5 billion
Priority sites	Northern Michigan; legacy fields
Special considerations	Great Lakes watershed protection

MISSISSIPPI

Metric	Count
Total historical wells	~10,000
Active wells	~3,000
Abandoned wells	~5,000
Documented orphan wells	~600
Primary formation(s)	Tuscaloosa Marine Shale; Black Warrior
Primary contaminants	Produced water; oil
Estimated healing cost	$200–600 million
Priority sites	Southwest Mississippi; Black Warrior Basin

MONTANA

Metric	Count

Metric	Count
Total historical wells	~15,000
Active wells	~5,000
Abandoned wells	~8,000
Documented orphan wells	~500
Primary formation(s)	Bakken Shale; Williston Basin
Primary contaminants	Produced water; oil spills
Estimated healing cost	$400 million – $1 billion
Priority sites	Bakken area; Fort Peck Reservation vicinity
Special considerations	Indigenous lands; agricultural water

NEW MEXICO

Metric	Count
Total historical wells	~70,000
Active wells	~25,000
Abandoned wells	~30,000
Documented orphan wells	~700
Primary formation(s)	Permian Basin; San Juan Basin
Primary contaminants	Methane; produced water; oil
Estimated healing cost	$2–5 billion
Priority sites	Permian Basin; San Juan Basin; Carlsbad area
Special considerations	Navajo Nation; water scarcity

NEW YORK

Metric	Count
Total historical wells	~35,000
Active wells	~5,000
Abandoned wells	~25,000
Documented orphan wells	~2,000
Primary formation(s)	Marcellus Shale (limited); legacy conventional
Primary contaminants	Methane; legacy contamination
Estimated healing cost	$500 million – $1.5 billion
Priority sites	Southern Tier; legacy oil regions
Special considerations	Fracking moratorium in place; legacy wells remain

NORTH DAKOTA

Metric	Count
Total historical wells	~35,000
Active wells	~15,000
Abandoned wells	~15,000
Documented orphan wells	~300
Primary formation(s)	Bakken Shale; Three Forks
Primary contaminants	Produced water; oil spills; NORM
Estimated healing cost	$1–3 billion
Priority sites	Bakken core area; Fort Berthold Reservation
Special considerations	Indigenous lands; extreme temperature cycles

OHIO

Metric	Count
Total historical wells	100,000+
Active wells	~20,000
Abandoned wells	~60,000
Documented orphan wells	20,000+
Primary formation(s)	Utica Shale; legacy conventional
Primary contaminants	Methane; legacy brine; produced water
Estimated healing cost	$2–6 billion
Priority sites	Eastern Ohio; legacy oil belt; injection well zone
Special considerations	High orphan count; induced seismicity history

OKLAHOMA

Metric	Count
Total historical wells	200,000+
Active wells	~40,000
Abandoned wells	100,000+
Documented orphan wells	18,000+
Primary formation(s)	SCOOP/STACK; Anadarko Basin; multiple plays
Primary contaminants	Produced water; methane; oil
Estimated healing cost	$5–15 billion
Priority sites	Cushing area; SCOOP/STACK; historic oil fields
Special considerations	Induced seismicity capital; 900+ earthquakes/year (2015)

PENNSYLVANIA

Metric	Count
Total historical wells	180,000+
Active wells	~8,000
Abandoned wells	100,000+
Documented orphan wells	27,000+
Primary formation(s)	Marcellus Shale; legacy conventional
Primary contaminants	Methane; fracking fluids; legacy contamination
Estimated healing cost	$5–12 billion
Priority sites	Dimock; legacy oil country; Marcellus core
Special considerations	Highest orphan well count; legacy contamination

TEXAS

Metric	Count
Total historical wells	450,000+
Active wells	180,000+
Abandoned wells	200,000+
Documented orphan wells	6,300+
Primary formation(s)	Permian Basin; Eagle Ford; Barnett; Haynesville
Primary contaminants	Produced water; oil; methane; NORM
Estimated healing cost	$15–40 billion
Priority sites	Permian Basin; Eagle Ford; legacy fields
Special considerations	Largest producer; water scarcity; scale of problem

WEST VIRGINIA

Metric	Count
Total historical wells	~90,000
Active wells	~10,000
Abandoned wells	~50,000
Documented orphan wells	6,000+
Primary formation(s)	Marcellus Shale; legacy conventional
Primary contaminants	Methane; produced water; legacy brine
Estimated healing cost	$1–4 billion
Priority sites	Northern panhandle; legacy oil fields

WYOMING

Metric	Count

Metric	Count
Total historical wells	~40,000
Active wells	~15,000
Abandoned wells	~20,000
Documented orphan wells	1,200+
Primary formation(s)	Powder River Basin; Jonah; Pinedale
Primary contaminants	Methane; produced water; benzene
Estimated healing cost	$1–3 billion
Priority sites	Pavillion (EPA–confirmed contamination); Jonah Field
Special considerations	Wind River Reservation; Pavillion contamination case

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SECTION G–3: PRIORITY HEALING ZONES (NATIONAL)

G–3.1 Tier 1: Immediate Action Required (Year 1)

Zone	States	Est. Wells	Reason
Pavillion, Wyoming	WY	100+	EPA–confirmed groundwater contamination
Dimock, Pennsylvania	PA	50+	Documented methane contamination
Oklahoma Earthquake Zone	OK	5,000+	Active induced seismicity
Standing Rock Vicinity	ND/SD	500+	Sacred lands; DAPL impact
Navajo Nation Impact Zone	NM/AZ	1,000+	Indigenous lands; uranium legacy
Fort Berthold Reservation	ND	1,000+	Active drilling on reservation
Los Angeles Urban Wells	CA	1,000+	Schools and homes within 500 feet
Kern County Frontline	CA	2,000+	Environmental justice communities

G–3.2 Tier 2: Priority Action (Years 1–3)

Zone	States	Est. Wells	Reason
Permian Basin Core	TX/NM	50,000+	Scale; water depletion; seismicity
Marcellus Shale Core	PA/WV/OH	20,000+	High well density; documented problems
Eagle Ford Shale	TX	15,000+	Environmental justice; water
Bakken Shale	ND/MT	10,000+	Indigenous lands; rapid development
San Juan Basin	NM/CO	10,000+	Navajo Nation; methane emissions

G–3.3 Tier 3: Comprehensive Healing (Years 3–10)

All remaining abandoned and orphan wells nationwide.

SECTION G–4: FEDERAL LAND WELLS

G–4.1 Bureau of Land Management Wells

Category	Count
Active wells on BLM land	~96,000
Idle wells on BLM land	~14,000
Orphan wells on BLM land	~2,500
Estimated healing cost	$2–5 billion

G–4.2 National Forest Wells

Category	Count
Active wells in National Forests	~3,000
Abandoned wells in National Forests	~2,000
Estimated healing cost	$300–800 million

G–4.3 Tribal Trust Land Wells

Category	Count
Active wells on tribal land	~45,000
Abandoned wells on tribal land	~15,000
Estimated healing cost	$2–6 billion
Priority consideration	Immediate; indigenous consent required

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SECTION G–5: OFFSHORE WELLS

G–5.1 Gulf of Mexico

Category	Count
Total wells drilled (historical)	~55,000
Active wells	~12,000
Platforms	~2,000
Idle/abandoned wells	~35,000
Estimated healing cost	$10–30 billion
Special considerations	Deepwater Horizon legacy; hurricane exposure

G–5.2 Pacific Outer Continental Shelf

Category	Count
Total wells drilled	~3,000
Active platforms	~23
Decommissioned platforms	~20

Category	Count
Estimated healing cost	$1–3 billion
Special considerations	Earthquake risk; coastal ecosystem

G–5.3 Alaska OCS

Category	Count
Exploration wells	~100
Production wells	~50
Estimated healing cost	$500 million – $2 billion
Special considerations	Arctic ecosystem; ice conditions

SECTION G–6: ESTIMATED COSTS BY STATE

State	Orphan Wells	Est. Plugging Cost (Traditional)	Est. RECOVER Healing Cost
Pennsylvania	27,000	$2.7 billion	$8–12 billion
Kansas	25,000	$2.5 billion	$7–10 billion
Ohio	20,000	$2.0 billion	$6–8 billion
Oklahoma	18,000	$1.8 billion	$5–8 billion
Kentucky	14,000	$1.4 billion	$4–6 billion
Texas	6,300	$630 million	$2–4 billion
West Virginia	6,000	$600 million	$2–3 billion
California	5,500	$550 million	$2–4 billion
Louisiana	4,500	$450 million	$1.5–3 billion
All Other States	~10,000	$1 billion	$3–6 billion
TOTAL (Documented)	**~136,000**	**$13.6 billion**	**$40–64 billion**
TOTAL (Including Undocumented)	**~1,000,000**	**$100 billion**	**$300–500 billion**
TOTAL (Full RECOVER for All Wells)	**2,500,000+**	**N/A**	**$10–20 trillion**

SECTION G–7: MONITORING AND UPDATES

G–7.1 Data Sources

This data shall be updated annually from:

1. Interstate Oil and Gas Compact Commission (IOGCC)

2. U.S. Energy Information Administration (EIA)
3. State oil and gas regulatory agencies
4. Environmental Defense Fund mapping projects
5. EPA Superfund and brownfield databases
6. Indigenous Earth Council records

G–7.2 Public Database

The Earth Healing Trust shall maintain a publicly accessible database including:

1. Location of every documented well (active, abandoned, orphan)
2. Current status (healing phase, certified, etc.)
3. Responsible party (if known)
4. Healing timeline
5. Monitoring data
6. Community concerns

CERTIFICATION

This state–by–state data represents the best available information as of the date of this Act's introduction. The Earth Healing Trust shall maintain and update this inventory continuously.

END OF APPENDIX G: STATE–BY–STATE WELL DATA AND PRIORITY SITES